

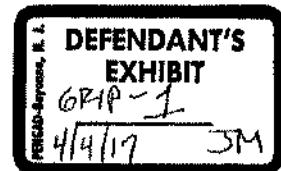
**Production and Interpretation of Aerial Photographs and Maps Covering  
the Garfield Avenue Site  
in Jersey City, New Jersey**



Randall Grip

Aero-Data Corporation LLC

October 7, 2016



### **Introduction**

Aero-Data Corporation was engaged by Plaintiff PPG Industries, Inc. to perform an historical aerial photographic study for the site of a former chrome chemical processing facility ("Plant") on Garfield Avenue in Jersey City, New Jersey ("Site"). Specifically, we were asked to obtain aerial photographs from the earliest date available through the mid-1960's and produce imagery for viewing and analysis.

Aerial photography and maps were acquired of the Site from public sources. In addition, I obtained the USGS 7.5 minute scale map and Digital Ortho Quarter Quadrangles (DOQQ) that covered the Site. The vertical photography was then registered to a common coordinate system and interpreted using digital photogrammetric procedures (soft copy).

### **Statement of Qualifications**

My name is Randall W. Grip. I have a Bachelor of Science Degree in Geography from Louisiana State University. I am vice-president of Aero-Data Corporation. Aero-Data specializes in aerial mapping and environmental studies using aerial photography and historical maps. Over the past 19 years, I have provided expert photo-interpretation and photogrammetry services for environmental assessment purposes. In the course of this work, I have participated in studies and obtained and interpreted aerial photographs of sites throughout the United States as well as in other foreign nations.

My expertise is in the area of review and analysis of readily available aerial photography. The processes I use include research and acquisition of stereoscopic photography, high resolution photogrammetric scanning, geo-registration of stereo images, and digital orthophoto production. I have been qualified as an expert witness in the fields of photo-interpretation and photogrammetry.

Aero-Data's client list includes many major corporations as well as government agencies such as the US Department of Justice, the Louisiana Department of Natural Resources, and the Louisiana Department of Environmental Quality.<sup>1</sup>

### **Information Considered in Forming Opinions**

My opinions are based upon aerial photography and maps of the Site as well as my experience and training. The maps were geo-referenced to the aerial photography using ArcGIS.

Attachment A is a listing of the aerial photography and other information that I have relied upon for this report.

### **Production of Geo-Registered Images and Maps**

I have produced digital stereoplotter based geo-registered imagery of all of the different dates of aerial photography obtained for this expert report. The imagery, as well as the geo-referenced maps, are included in Attachment B.

### **Area of Expertise in Which I Expect To Testify**

I expect to testify in the areas of photointerpretation and photogrammetry. Photointerpretation is the science of identifying objects in photography and determining their meaning. Photogrammetry is defined as the science of taking measurements from photography. In practical terms, photogrammetry is the science of making maps. My interpretations and opinions outlined in this report are true to a reasonable degree of scientific certainty. Attachment C is my current resume, and Attachment D is a listing of my Trial Testimony,

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<sup>1</sup> Exemplar cases include: The United States of America v. 8.34 Acres of Land, and AJL Enterprises, et al., Civil Action No. 04-5-D-M1, U.S. District Court, Middle District of Louisiana; and The Shoshone & Arapaho Indian Tribes of the Wind River Reservation v. The United States of America, Civil Action No. 459a79L U.S.D.C Wyoming

Deposition Testimony, and Publications. My billing rate is \$150 per hour for mapping, report production, and testimony.

#### **Site Area**

For the purposes of this report, the Site Area is located on Garfield Avenue in Jersey City, New Jersey. I have superimposed the Site Area on both the Jersey City, NJ 7.5' minute quadrangle and the USGS Digital Ortho Quarter Quad.

#### **Interpretations by Date**

##### **1908 Map**

This map shows street names, buildings and parcel boundaries. The Site Area, in yellow, has been superimposed over the map. The Site is bounded by Garfield Avenue, Caven Point Avenue, Halladay Street, Forrest Street and the New York Railroad. Hudson Co. Gas Co. is visible on the eastern portion of the Site with two gas holders present. The Morris Canal is visible running southeast to northwest and bisecting the Site.

Commercial Street (southeast of Garfield Ave.), Jane Street, Valley Street, Woodward Street, Van Horne Street and Carteret Avenue are included on this map. By the first date of photography, 4/6/1940, these streets are not present, and buildings and large stockpiles are seen in their place.

##### **May and July 1932 Photos NJDEP**

These monoscopic photographs show the conditions of the Site on May and July 1932.

The Site is composed of three main areas being utilized: the Plant buildings, the stockpile area north and south of Carteret Street and the area behind (east) of the Plant containing gas holders and tanks. The main Plant buildings are visible on the northwestern portion of the Site Area.

Carteret Avenue, which was previously visible in the 1908 map is no longer present. The former location has been mapped with a dotted white line. Carteret Avenue divided the Site into a northern and southern portion.

The stockpile areas north and south of the former Carteret Street area are visible but have not been mapped since the imagery is not stereoscopic.

The Morris Canal, which was also visible on the 1908 map, is no longer visible, and its former location is mapped with a dotted black line. A ditch is visible crossing over the former location of the canal in the southern portion of the Site and then travels north along the northwestern side of the stockpiles.

##### **4/6/1940 TXAERO**

Two large stockpiles are visible south of the Plant along Halladay Street. Terrain (elevation) Models were generated for these pile areas to determine the approximate volume. The piles were separated into two areas. The stockpile north of Carteret Avenue is mapped and calculated to be approximately **70,716 cubic yards** and the stockpile south of Carteret Avenue is approximately **129,855 cubic yards**. Using my stereoplotter for this and subsequent dates, I have measured the maximum height of each pile relative to a point at the intersection of Halladay Street and Carteret Avenue. I have also measured the approximate maximum length and width of each pile. The north stockpile is **46 feet tall** at its highest point. The south stockpile is **64 feet tall** at its highest point. The north stockpile is **333 feet long** and **237 feet wide**. The overall south stockpile is approximately **594 feet long** and **312 feet wide**.

The gas holders first visible in the 1908 map remain present on the northeastern portion of the Site along Halladay Street. Four smaller tanks are visible to the north of the gas holders.

There are several buildings on the western portion of the Site south of the former Carteret Avenue, but the area is mostly undeveloped.

**11/1/1940 NARA**

The Plant and gas holders remain present.

The stockpiles remain visible, and terrain models were generated for these pile areas to determine the approximate volume. The stockpile north of Carteret Avenue is mapped and calculated to be approximately **70,991 cubic yards**, and the stockpile south of Carteret Avenue is approximately **146,899 cubic yards**. The north stockpile is **46 feet tall** at its highest point. The south stockpile is **64 feet tall** at its highest point. The north stockpile is **341 feet long and 219 feet wide**. The south stockpile is split in to two piles, one is **379 feet long and 263 feet wide**, the other is **202 feet long and 315 feet wide**.

**12/22/1943 and 12/24/1943 NOS**

These photomissions are only 2 days apart and the conditions on the Site on both dates are virtually identical.

The plant and gas holders remain present.

The stockpiles remain visible, and terrain models were generated for these pile areas to determine the approximate volume. The stockpile north of Carteret Avenue is mapped and calculated to be approximately **74,204 cubic yards**, and the stockpile south of Carteret Avenue is approximately **179,749 cubic yards**. The north stockpile is **45 feet tall** at its highest point. The south stockpile is **70 feet tall** at its highest point. The north stockpile is **339 feet long and 232 feet wide**. The south stockpile is **596 feet long and 306 feet wide**.

**7/1/1944 NARA**

The Plant and gas holders remain present.

The stockpiles remain visible, and terrain models were generated for these pile areas to determine the approximate volume. The stockpile north of Carteret Avenue is mapped and calculated to be approximately **78,961 cubic yards**, and the stockpile south of Carteret Avenue is approximately **169,740 cubic yards**. The north stockpile is **47 feet tall** at its highest point. The south stockpile is **68 feet tall** at its highest point. The north stockpile is **332 feet long and 233 feet wide**. The south stockpile is **597 feet long and 300 feet wide**.

**4/28/1947 Robinson**

The Plant remains present. A light toned pile is visible on the south portion of the Plant footprint. A terrain model was generated, and the approximate volume of the light toned pile is **5,992 cubic yards**. It is **20 feet tall** at its highest point and measures **219 feet long and 99 feet wide**.

The gas holders and tanks north of the Gas Holders are no longer present.

The stockpiles remain visible, and terrain models were generated for these pile areas to determine the approximate volume. The stockpile north of Carteret Avenue is mapped and calculated to be approximately **76,307 cubic yards**, and the stockpile south of Carteret Avenue is approximately **199,109 cubic yards**. The north stockpile is **54 feet tall** at its highest point. The south stockpile is **88 feet tall** at its highest point. The north stockpile is **341 feet long and 239 feet wide**. The south stockpile is **570 feet long and 307 feet wide**.

A graded area is visible west of the stockpiles along Garfield Avenue. By the next date of photography, eight new buildings/structures are visible in this location. A portion of the ditch southeast of the stockpiles is no longer visible and may have been covered during grading activities.

**4/7/1951 TXAERO**

The Plant remains present, and the light toned pile remains visible.

The stockpiles remain visible, and terrain models were generated for these pile areas to determine the approximate volume. The stockpile north of Carteret Avenue is mapped and calculated to be approximately **72,989 cubic yards**, and the stockpile south of Carteret Avenue is approximately **202,896 cubic yards**. The north stockpile is **52 feet tall** at its highest point. The south stockpile is **85 feet tall** at its highest point. The north stockpile is **348 feet long** and **233 feet wide**. The south stockpile is **568 feet long** and **296 feet wide**.

Eight rectangular buildings/structures are visible along Garfield Avenue on the former graded area from 4/28/1947. To the south of these buildings, an area of junked vehicles is visible. The junkyard increases in surface area over time.

The ditch south of the former Carteret Avenue is no longer visible and has been covered. The ditch north of the former Carteret Avenue remains present.

**6/8/1953 NARA**

The Plant remains present, and the light toned pile remains visible.

The stockpiles remain visible, and terrain models were generated for these pile areas to determine the approximate volume. The stockpile north of Carteret Avenue is mapped and calculated to be approximately **67,627 cubic yards**, and the stockpile south of Carteret Avenue is approximately **161,641 cubic yards**. The north stockpile is **39 feet tall** at its highest point. The south stockpile is **69 feet tall** at its highest point. The north stockpile is **344 feet long** and **234 feet wide**. The south stockpile is **535 feet long** and **271 feet wide**.

**12/5/1953 Intrasearch**

The Plant remains present, and the light toned pile remains visible. A terrain model was generated of the light toned pile, and the approximate volume of the light toned pile is **4,563 cubic yards**. It is **20 feet tall** at its highest point and measures **155 feet long** and **78 feet wide**.

The stockpiles remain visible, and terrain models were generated for these pile areas to determine the approximate volume. The stockpile north of Carteret Avenue is mapped and calculated to be approximately **73,505 cubic yards**, and the stockpile south of Carteret Avenue is **154,131 cubic yards**. The north stockpile is **43 feet tall** at its highest point. The south stockpile is **61 feet tall** at its highest point. The north stockpile is **349 feet long** and **239 feet wide**. The south stockpile is **531 feet long** and **257 feet wide**.

**1/4/1954 USGS**

The Plant remains present, and the light toned pile remains visible.

The stockpiles remain visible, and terrain models were generated for these pile areas to determine the approximate volume. The stockpile north of Carteret Avenue is mapped and calculated to be approximately **73,282 cubic yards**, and the stockpile south of Carteret Avenue is **149,395 cubic yards**. The north stockpile is **43 feet tall** at its highest point. The south stockpile is **61 feet tall** at its highest point. The north stockpile is **340 feet long** and **233 feet wide**. The south stockpile is **504 feet long** and **253 feet wide**.

**2/18/1954 USGS**

The Plant remains present.

The stockpiles both north and south of Carteret Avenue are visible. Since the condition of the two stockpiles is virtually identical to their 1/4/1954 conditions, a terrain model was not produced.

**5/24/1958 COLEAST**

The Plant remains present. The light toned pile is no longer visible.

Carteret Avenue has been mapped and is present bisecting the Site. The stockpiles both north and south of Carteret Avenue are no longer visible. To the north of Carteret Avenue, smaller piles of material are visible within and north of the former stockpile footprint.

The ditch remains visible north of the former location of Carteret Avenue, and additional drainage features are visible southeast of the Plant.

**4/16/1959 Robinson**

The Plant remains present with piles of material visible. Carteret Avenue has been mapped and is present bisecting the Site. Southeast of the Plant, a small pile has been added and two removed north of Carteret Avenue.

**4/12/1961 Aerial Viewpoint**

The Plant remains present with piles of material visible. Smaller piles of material southeast of the Plant remain visible with additional small piles added since the previous date of photography.

**5/7/1962 Intrasearch**

The Plant remains present with piles of material visible. Smaller piles of material southeast of the Plant remain visible, and several areas of pile removal are seen since the previous date of photography.

**11/12/1962 NOS**

The Plant remains present with piles of material visible. Smaller piles of material southeast of the Plant remain visible. There are no significant changes since the previous date of photography.

**1/4/1963 Robinson**

The Plant remains present with piles of material visible. Smaller piles of material southeast of the Plant remain visible and one area of pile removal is visible since the previous date of photography.

**6/20/1966 NOS**

The buildings, tanks and piles associated with the Plant have been removed.

The piles of material southeast of the Plant are no longer visible. The ditch remains present southeast of the former Plant buildings.

**3/18/2007 USGS**

The 2007 aerial photo was downloaded as a geo-registered orthophoto. The Site Area, in yellow, has been superimposed over the image and the main roads labeled.

**Historical Oblique Aerial Photos**

**Oblique 102922, 102931B**

This is an image taken after 4/28/1947 from the southeast looking northwest. The image shows the Plant buildings and the stockpiles along Halladay Street.

**Oblique 103164, 103165**

This is an image taken after 4/28/1947 from the east looking west. The image shows the Plant buildings and the stockpiles along Halladay Street.

**Oblique 103173**

This is an image taken after 4/28/1947 from the west looking east. The image shows the Plant buildings and the stockpiles along Halladay Street.

#### **Oblique 103180B, 103181**

This is an image taken after 4/28/1947 from the east looking west. The image shows the Plant buildings and the stockpiles along Halladay Street.

#### **Stockpile Terrain Model Oblique Views**

The terrain models are a 3D representation of the surface. The terrain modeling was produced using the following 10 dates of photography: 4/6/1940, 11/1/1940, 12/22/1943, 12/24/1943, 7/1/1944, 4/28/1947, 4/7/1951, 6/8/1953, 12/5/1953, and 1/4/1954. Once imported into the GIS, the software could change the display of the terrain model to an oblique angle and allow the user to tip and rotate the elevation model for a better understanding of the Site's topography.

Images from the oblique views of each of the 10 dates were produced from the same perspective and scale. A set of images has been produced of the Site from the north looking towards the south. Each has been printed and is included in this report.

#### **Anaglyph Images**

For stereo viewing of the aerial images while reading this report, anaglyph (3-D) images were produced by the digital stereoplotter from the stereomodels. The anaglyph is produced by merging the two overlapping stereo images into a composite digital image with the left frame colored red and the right frame colored blue.

By viewing the anaglyph image through red and blue glasses, the composite image is separated into two slightly different images, one for each eye. This allows a reader with normal stereovision to perceive a stereo (or 3-D) view of the Site.

Anaglyph images are produced using a stereo pair of successive photos along a flight line. The image orientation is dependent on the direction of the flight line. For example, north-south flight lines will have an anaglyph with west orientated to the top. East-west flight lines will have an anaglyph with north oriented to the top.

Anaglyph images were produced from the following 18 dates of photography and are included as exhibits in this report: 4/6/1940, 11/1/1940, 12/22/1943, 12/24/1943, 7/1/1944, 4/28/1947, 4/7/1951, 6/8/1953, 12/5/1953, 1/4/1954, 2/18/1954, 5/24/1958, 4/16/1959, 4/12/1961, 5/7/1962, 11/12/1962, 1/14/1963, and 6/20/1966.

#### **Control Points and Check Points**

The control points used to setup the stereomodels have been superimposed over the LiDAR Terrain and the 2007 imagery.

The terrain modeling was produced using 10 dates of photography taken at different altitudes. We have compiled elevation check points both on and offsite to confirm the reasonable accuracy of each of the dates to the initial ground control from the LiDAR data. The check points, 22 total, used to verify the accuracy have been superimposed over the 2007 imagery. The building heights measured with the stereo plotter were confirmed using LiDAR terrain model.

#### **Methods and Materials**

##### **Aerial research and acquisition**

The historical aerial photography study of the Site began with research for available photo coverage from public and private vendors. The photo coverage was then obtained in the form of frames consisting of vertical stereoscopic photography in a 9"x9" format and/or orthophotos.

#### **Initial review and date verification**

The frame or scan for each photomission (date of photography) was reviewed and examined for proper geographic coverage of the Site and filed into separate folders for each photomission.

#### **Setting up the stereomodels**

Two or more raster images for each stereo date of photography were then imported into a digital stereoplotter capable of providing stereoscopic viewing of the images at magnification levels ranging from 1x to 128x. The digital stereoplotter also allows precise mapping of significant environmental features, which are interpreted, in the 3-D imagery.

Ground control (State Plane New Jersey Zone NAD83) for the initial stereomodel, 6/20/1966, was derived from the 3/18/2007 USGS imagery and the Lidar terrain model.

The coordinates of each selected visible ground control point were then entered into a control point file in the digital stereoplotter. The floating dot (measuring point) of the stereoplotter was carefully positioned by the operator with the hand controller, one point at a time, onto each of the visible control points and the coordinates of that point (from the ground control point file) were assigned to the image. When sufficient control points had been visited, accepted and the model checked for residual errors, the stereo model was then confirmed to be level, scaled and locked into the coordinate system. As a result, accurate measurements of heights and distances could now be made within the stereo model area by using the digital stereoplotter.

Other stereo models for the remaining dates of photography were then set up using ground control points derived from the initial stereo model. As a result the stereo models for all dates accurately register one to another allowing the photo interpreter to detect and map changed areas.

#### **Digital Ortho Production**

Next, using the stereomodels and digital stereoplotter, a digital orthophoto was produced for each date of photography. A digital orthophoto is a two dimensional raster image produced from one or more frames of vertical aerial photography such that most of the distortion caused by terrain displacement and tip and tilt in the mapping camera has been removed, and the resulting raster image is accurately registered to a chosen coordinate system. As a result, each digital orthophoto accurately depicts the roads, building bases and other significant features located within the Site in their true geographic position. However, distortion caused by the height of buildings was not removed. As a result, the bases of these structures are displayed in their true position, while their tops may be displaced.

Digital orthophotos are widely accepted today by both government and industry as an improvement over the base maps and photomosaics previously used to show the locations of features within a geographic area. Digital orthophotos have the accuracy of a stereoplotter or land survey produced map with the resolution of a photograph.

#### **Photointerpretation**

Photointerpretation of the Site was conducted primarily on the digital stereoplotter using the same digital stereo models used to produce the digital orthophotos. The digital stereoplotter allows me to view the Site in 3-D on a stereo computer monitor or large computer projection screen, normally at magnification factors ranging from 8X to 32X while identifying and mapping the outlines of features.

When necessary to map very small features, I could zoom to magnification factors as high as 128X. Generally speaking, zoom settings greater than 32X do not yield more detail, but they do help in carefully mapping small features.

The interpretation done with the digital stereoplotter captured all features in their true position. Stereo

models for different dates were viewed and rapidly (in one to two seconds) toggled back and forth on the stereo display to facilitate the detection of changes that occurred to the Site over time. Each class of significant features mapped was recorded on a separate layer and color-coded. The vector files and images were then exported from the digital stereo plotter to a computer for further use. The digital stereoplotter (soft copy) when used in this manner is an extremely powerful photointerpretation tool. I understand that soft copy was originally developed for the military for photointerpretation purposes. Current development of the technology is ongoing. The cost of development is supported by various military and intelligence gathering organizations, NASA and conventional mapping companies similar to my own.

#### **Topographic Mapping/Terrain Model Production**

Topographic mapping involves the mapping of surface elevations. Topographic mapping traditionally uses contour lines and spot elevations to portray the shape and elevation of the land. Topographic maps render the three-dimensional ups and downs of the terrain on a two-dimensional surface.

The topography of a surface can also be represented with terrain modeling using a TIN (Triangulated Irregular Network). Using the stereomodels, the operator uses the hand controller to manually measure points on the land surface. The result is a TIN which is a vector based model representation of the physical land surface using a set of contiguous, non-overlapping triangles. Within each triangle, the surface is represented by a plane.

#### **Volume calculations**

The TINs were then imported into ArcGIS 3-D Analyst, a volume calculating software package. The software then compared the TIN to the base surface (elevation) to determine the volume of the material piles.

The software could also change the display of the TIN to an oblique angle and allow the user to tip and rotate the elevation model for a better understanding of the Site's topography.

#### **ArcView GIS**

The digital orthophotos with the interpretation overlays were next imported into ArcView GIS. ArcView is a very popular geographic information system (GIS) produced by ESRI and sold throughout the world. For the purposes of this report, the interpreted images are referred to as "mapped images". Hard copies of the mapped images were then printed in an 8.5"x11" or larger format from a PC using a high-resolution printer.

The interpreted images and registered maps located in the interpretations section of this report contain specific information and opinions which must be viewed by the reader in order to fully understand this report. These opinions supplement the textual opinions identified in my report. The mapped images (Attachment B) constitute the primary source of information in this report. They were prepared so that they may be displayed using computer generated prints or a computer projection system running ArcView or other software. ArcView GIS provides a wide range of capabilities such as zooming, turning themes (layers) on and off and measuring distances. Interpreted images and maps will be used as exhibits at trial in my testimony. There may be additional demonstrative exhibits used at trial as well.

#### **Conclusion**

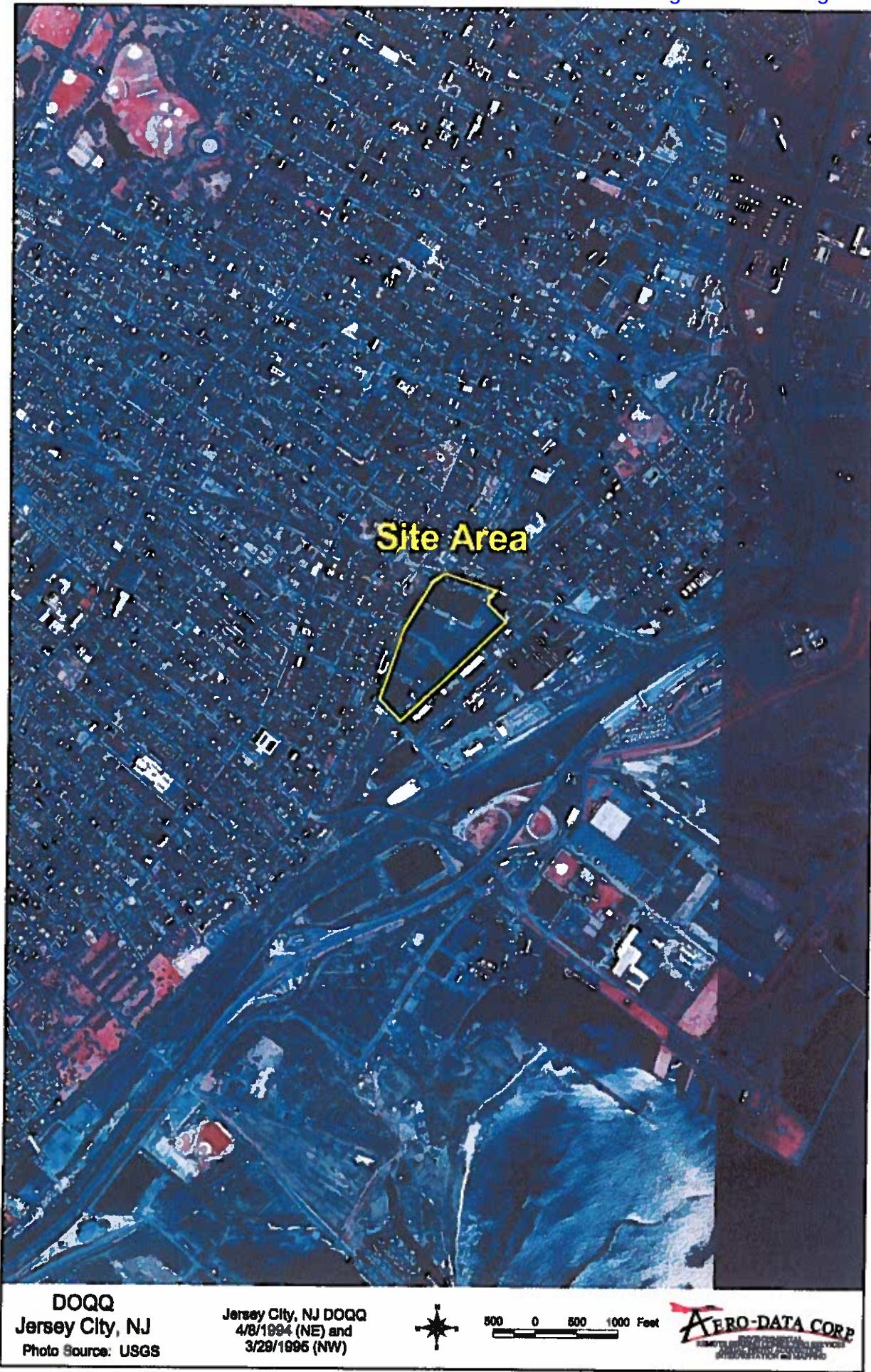
Given that the parties are simultaneously serving expert reports in this matter, and the Court's scheduling permitting rebuttal reports, I reserve the right to revise and supplement this report, including but not limited to the volumetric calculations set forth within.

**Attachment A**  
**Information Relied Upon**

City	State	Date	Ratio	Type	Source	Frames and Notes	Focal length
Jersey City	NJ	1/1/1908		MAP	NYPLDC/HOPKINS		
Jersey City	NJ	1/1/1932		B/W	NJDEP	5/1932 and 7/1932	
Jersey City	NJ	4/6/1940	20000	BW	Aerial Viewpoint/TXAERO	111, 112	
Jersey City	NJ	4/6/1940	20000	BW	Aerial Viewpoint/TXAERO	192, 193	
Jersey City	NJ	11/1/1940	24000	BW	NARA	649-651	
Jersey City	NJ	12/22/1943	20000	BW	NOS	255, 256	
Jersey City	NJ	12/24/1943	20000	BW	NOS	398, 399	
Jersey City	NJ	7/1/1944	10000	BW	NARA	11, 12	
Jersey City	NJ	4/28/1947	12000	BW	ROBINSON	277, 278	8.25in.
Jersey City	NJ	4/7/1951	20000	BW	Aerial Viewpoint/TXAERO	2752, 2753	152.75mm
Jersey City	NJ	6/8/1953	24000	BW	NARA	79, 80	152.32mm
Jersey City	NJ	12/5/1953	20000	BW	INTRASEARCH	37, 38	
Jersey City	NJ	12/5/1953	20000	BW	INTRASEARCH	97, 98	
Jersey City	NJ	1/4/1954	20000	BW	USGS	58, 59	153.22mm
Jersey City	NJ	2/18/1954	20000	BW	USGS	88, 89, 90	154.82mm
Jersey City	NJ	1/1/1967	24000	Map	USGS	Jersey City, Ny- NJ 7.5 Minute DRG REVISED 1981	
Jersey City	NJ	5/24/1958	19726	BW	COL-EAST	7, 8	
Jersey City	NJ	4/16/1959	18000	BW	ROBINSON	6, 7	210mm
Jersey City	NJ	4/12/1961	18000	BW	Aerial Viewpoint/TXAERO	232, 233	152.22mm
Jersey City	NJ	4/12/1961	36000	BW	NOS	5691, 5692	153.02mm
Jersey City	NJ	5/7/1962	12000	BW	INTRASEARCH	161, 162	152.??mm
Jersey City	NJ	11/12/1962	30000	BW	NOS	2300A, 2301A	153.02mm
Jersey City	NJ	1/14/1963	14400	BW	ROBINSON	63, 64	
Jersey City	NJ	6/20/1966	30000	BW	NOS	9001, 9002	152.29mm
Jersey City	NJ	3/29/1995		DOQQ	USGS	Jersey City NJ NW and NE DOQQ	
Jersey City	NJ	3/18/2007		COL	USGS	Orthophotos	
Jersey City	NJ	2014 Post Sandy		Lidar	NOAA/USGS		
Jersey City	NJ			BW	Fairchild	Fairchild Oblique Images	

***Attachment B***

**Site Area**



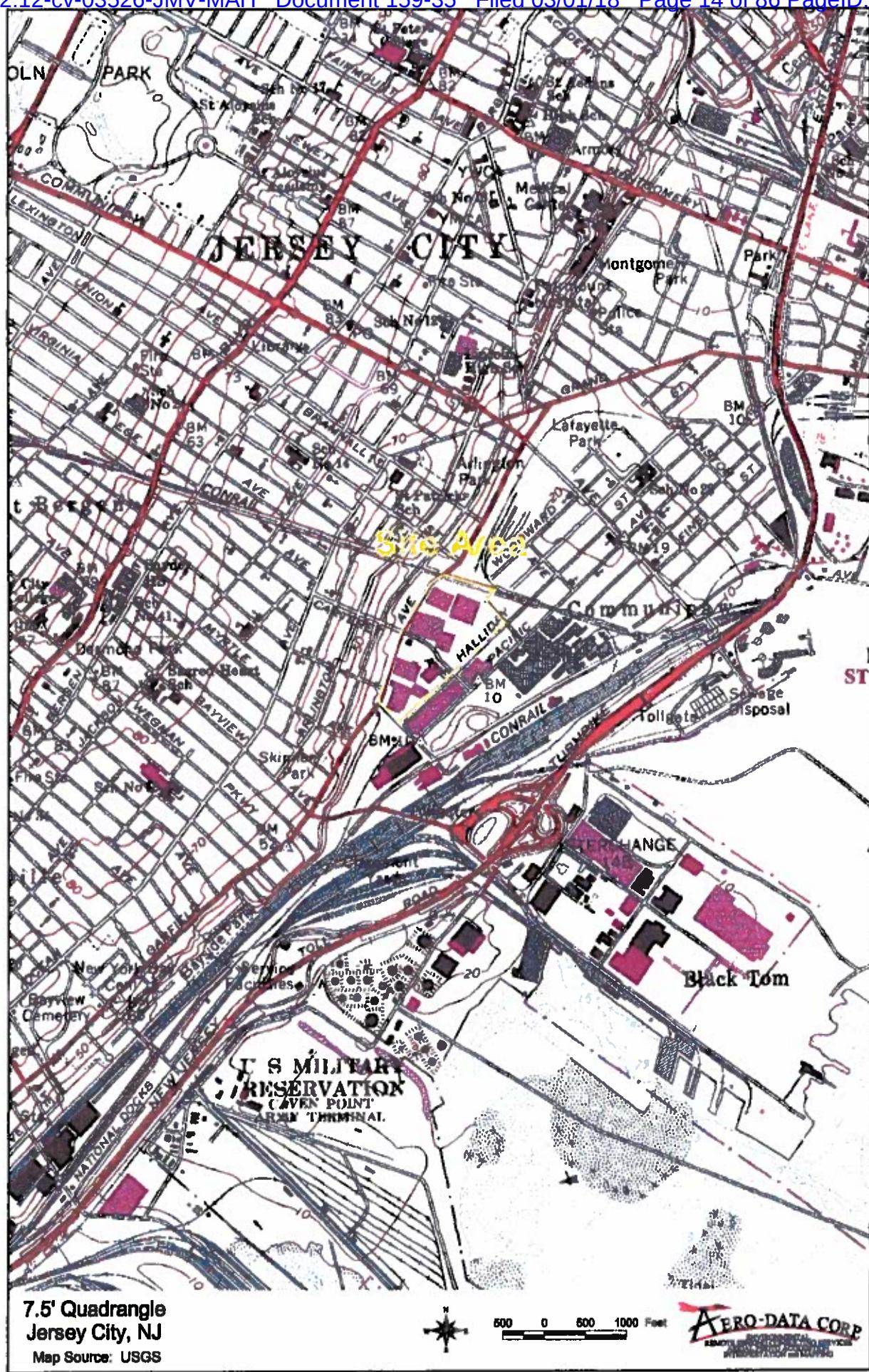
DOQQ  
Jersey City, NJ  
Photo Source: USGS

Jersey City, NJ DOQQ  
4/8/1994 (NE) and  
3/29/1996 (NW)

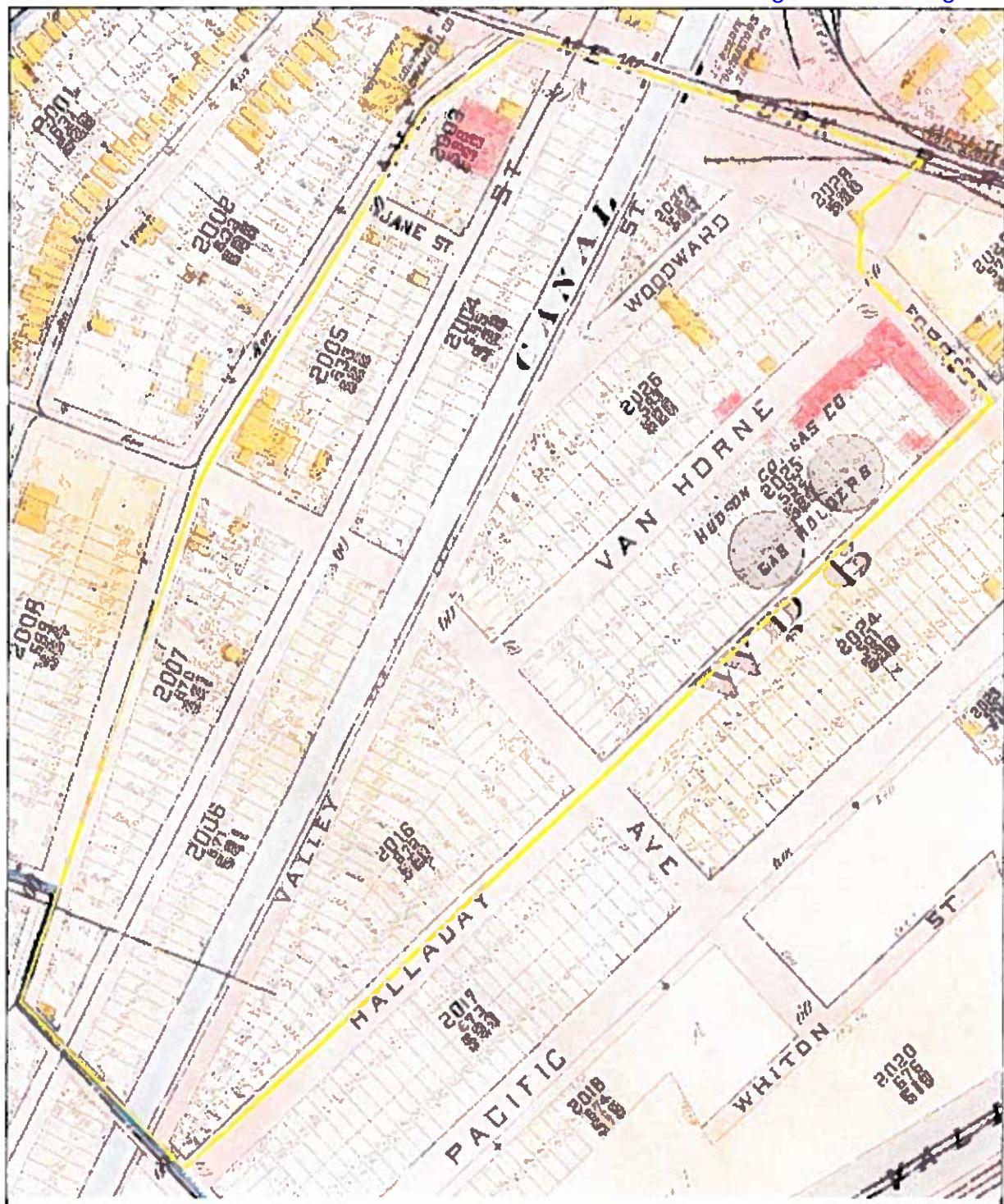


500 0 500 1000 Feet

~~AERO-DATA CORP.~~  
AERIAL PHOTOGRAPHIC SERVICES  
INTERFACIAL INFORMATION SYSTEMS



***Orthophotos and Maps***

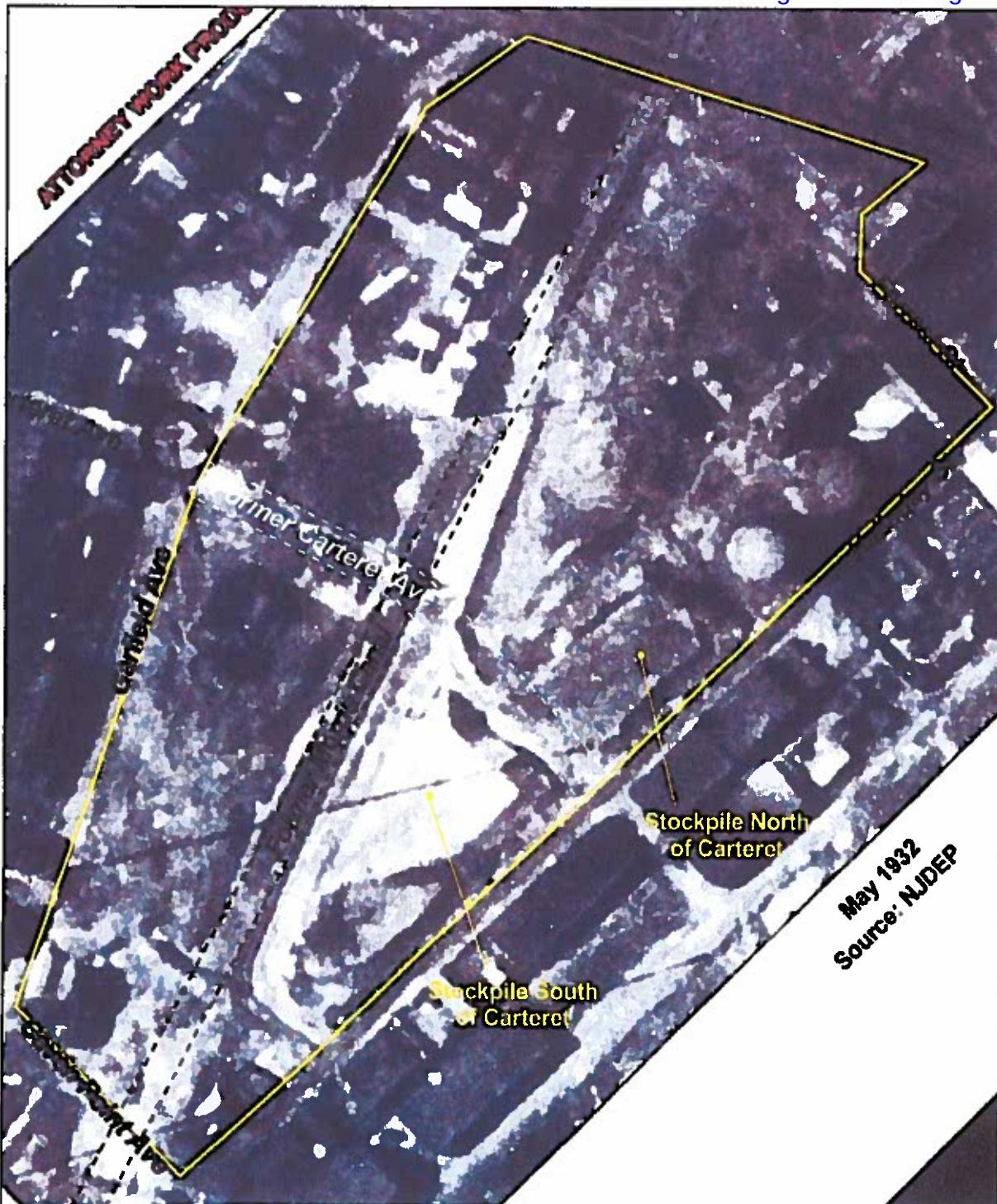


1908 Map  
Jersey City, NJ  
Photo Source: NYPL

**Legend**  
■ Site Area



80 0 80 160 Feet



May 1932  
Jersey City, NJ

Photo Source: NJDEP by Opposition

*Legend*

- Pile Area Volume
- Site Area
- Tanks
- Structure
- Road
- Railroad
- Fence
- Drainage/Water
- Buildings

Former Carteret Ave. and Former Morris Canal from 1906 NYPL Map

Underlying Image  
USNPR0013839



80 0 80 160 Feet

AERO-DATA CORP.  
AERIAL SURVEY & IMAGE PROCESSING



July 1932  
Jersey City, NJ

Photo Source: NJDEP by Opposition

*Legend*

- |                  |                |
|------------------|----------------|
| Mapped Piles     | Labels         |
| Pile Area Volume | Road           |
| Site Area        | Railroad       |
| Tanks            | Fence          |
| Structure        | Drainage/Water |
|                  | Buildings      |

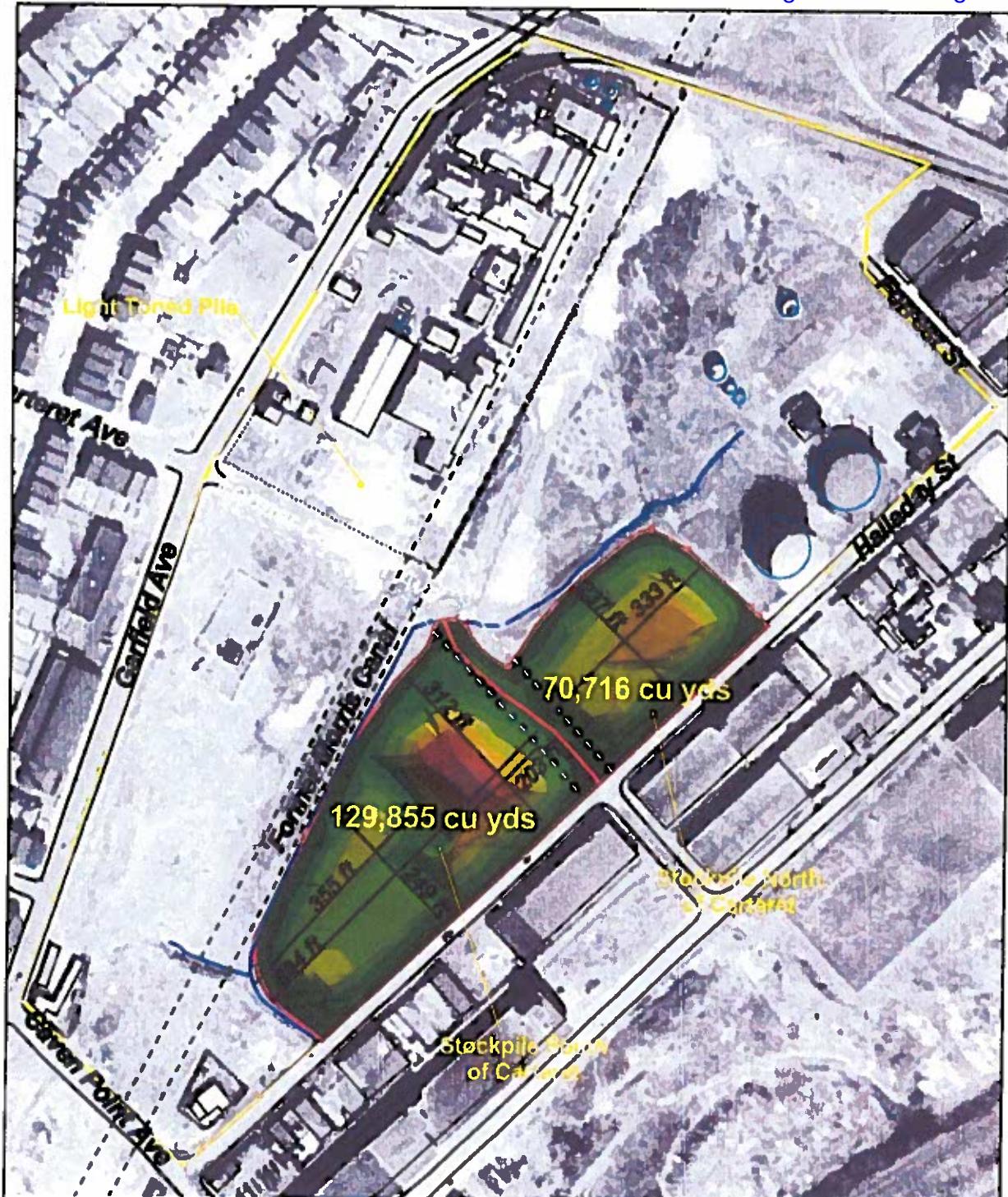
Former Carteret Ave. and Former Morris Canal from 1906 NYPL Map

Underlying Image  
USNPR0013593



80 0 80 160 Feet

AERO-DATA CORP.



4/6/1940  
Jersey City, NJ

Photo Source: Aerial Viewpoint



**Pile Terrain Model  
Elevation Range (Feet)**

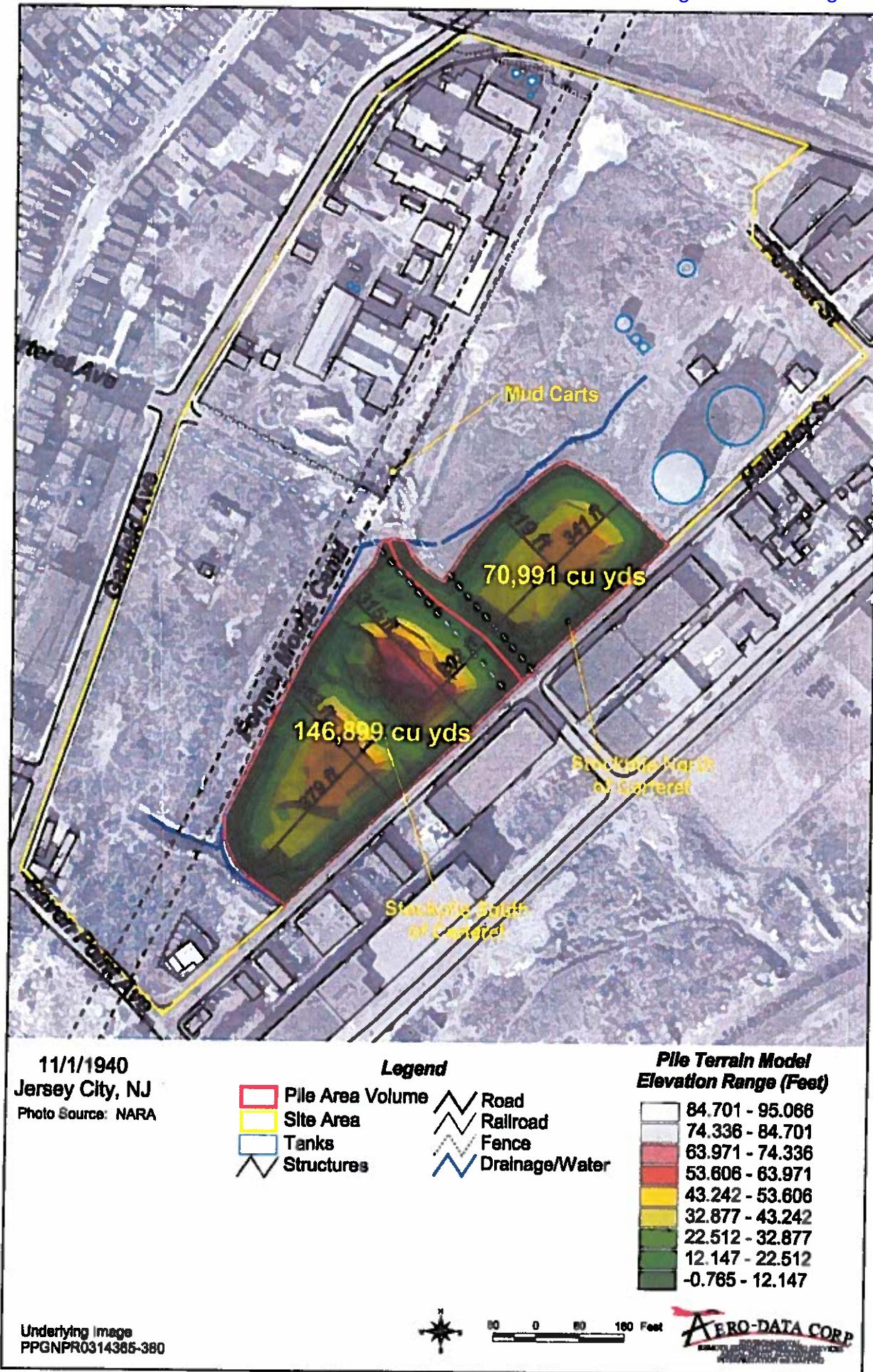
84.701 - 95.066
74.336 - 84.701
63.971 - 74.336
53.606 - 63.971
43.242 - 53.606
32.877 - 43.242
22.512 - 32.877
12.147 - 22.512
-0.765 - 12.147

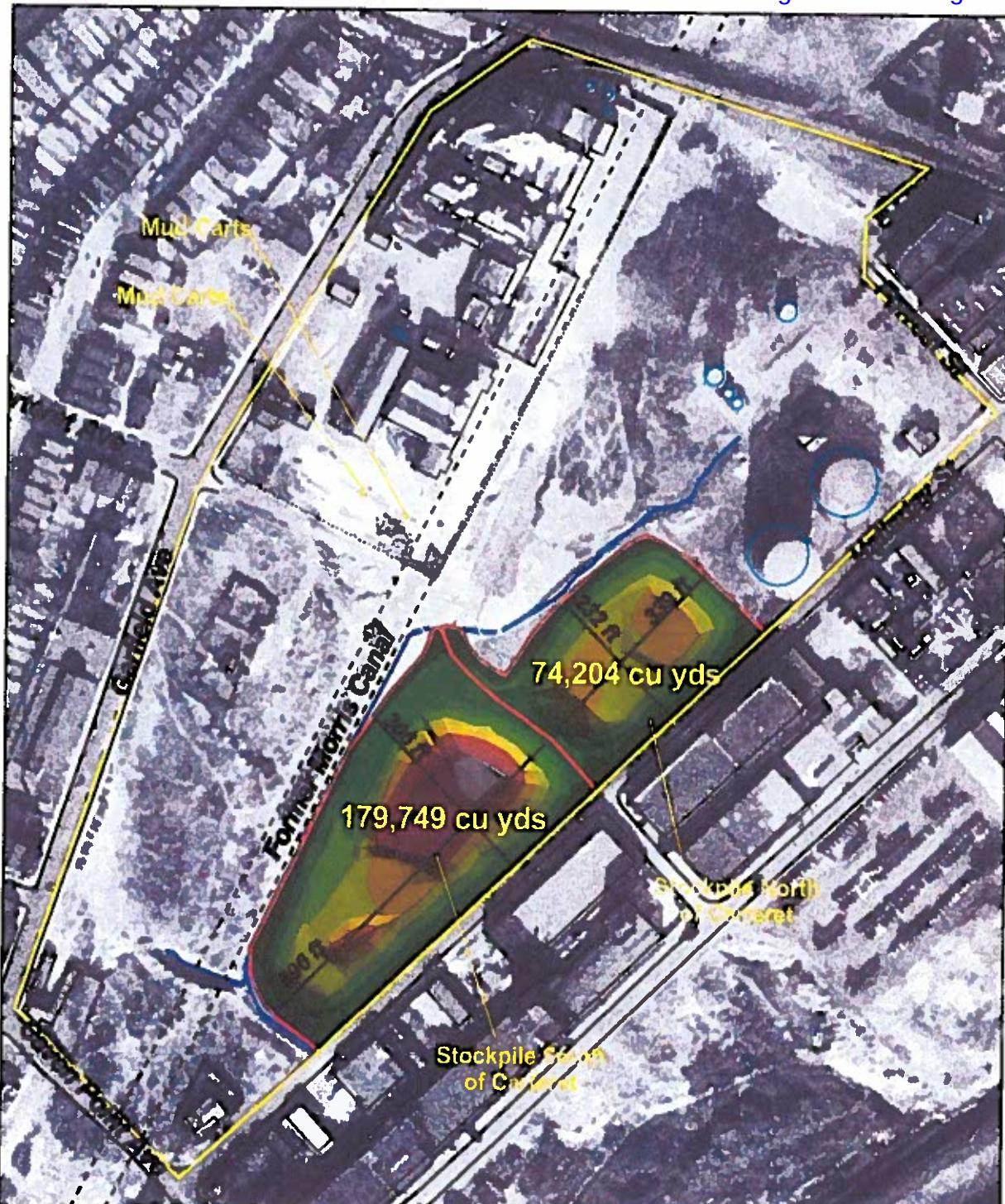
Former Carteret Ave. and Former Morris Canal from 1808 NYPL Map

Underlying Image  
PPGNPR0024485  
PPGNPR0314365-380



**AERO-DATA CORP**





12/22/1943  
Jersey City, NJ  
Photo Source: NOS



*Pile Terrain Model  
Elevation Range (Feet)*

	84.701 - 95.066
	74.336 - 84.701
	63.971 - 74.336
	53.606 - 63.971
	43.242 - 53.606
	32.877 - 43.242
	22.512 - 32.877
	12.147 - 22.512
	-0.765 - 12.147

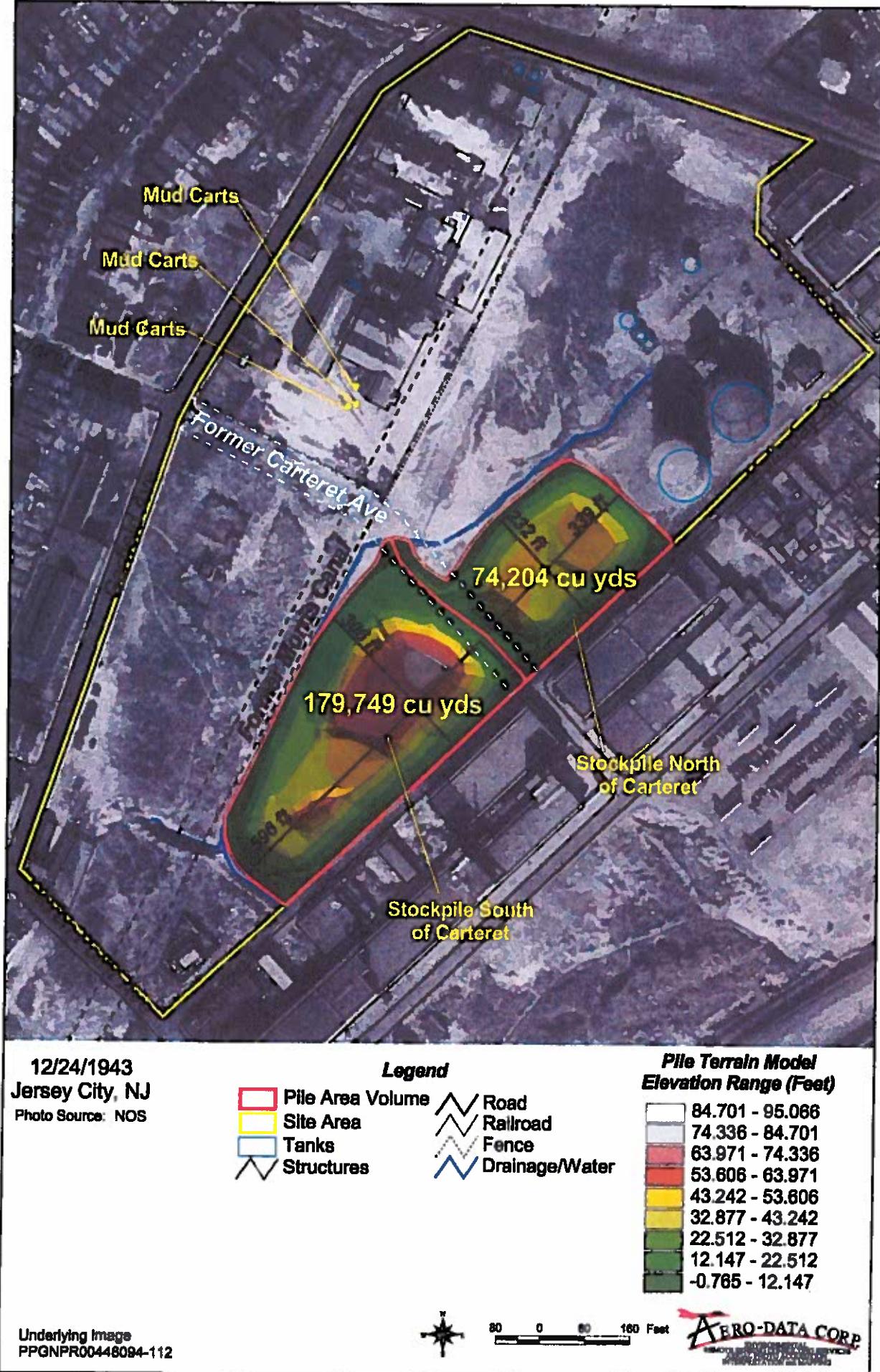
All Mapping Completed with 12/24/1943 Imagery

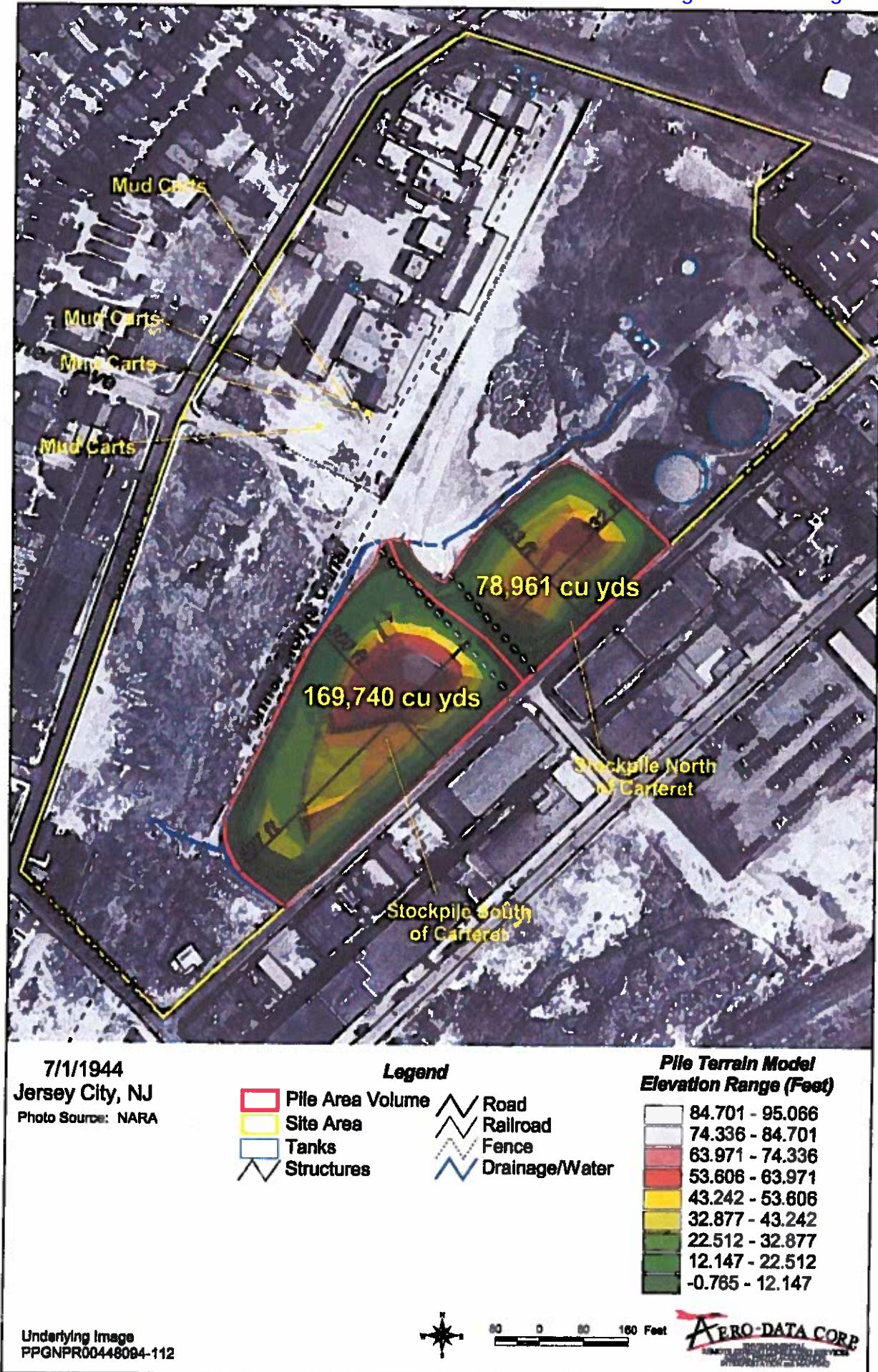
Underlying Image  
PPGNPR0048094-112  
PPGNPR0782415-432

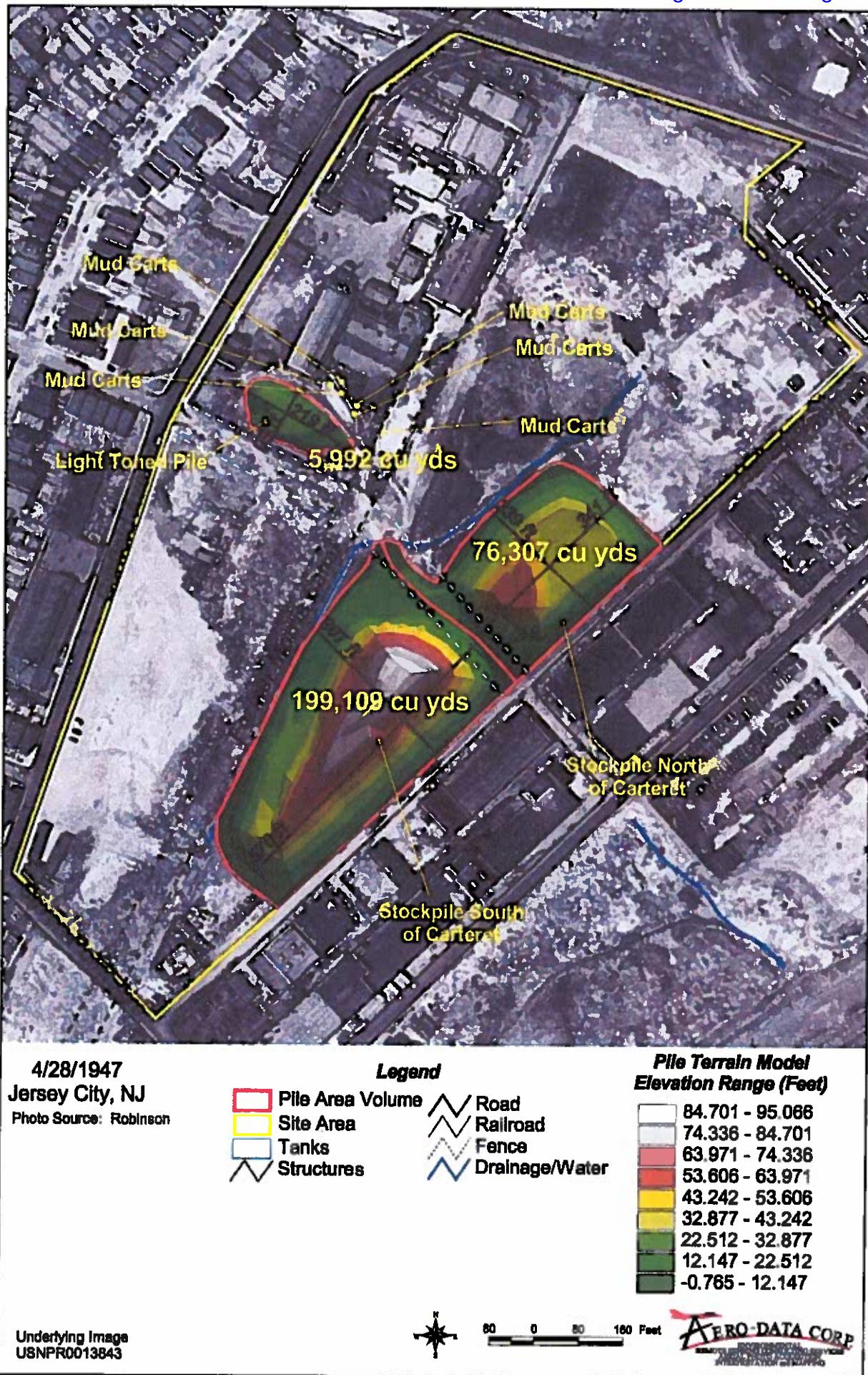


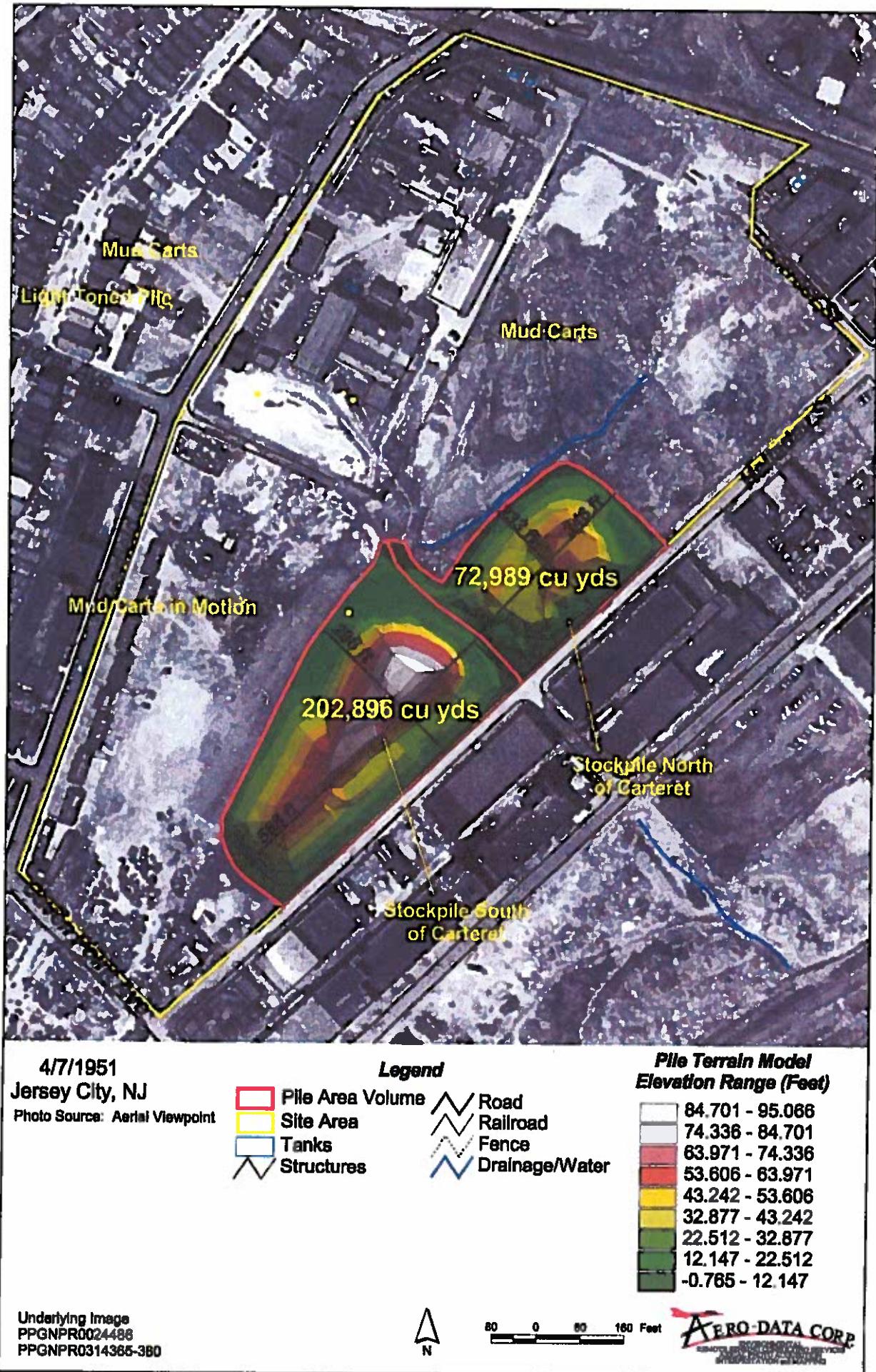
80 0 80 160 Feet

AERO-DATA CORP











6/8/1953  
Jersey City, NJ  
Photo Source: NARA

- Pile Area Volume  
 Site Area  
 Tanks  
 Structures

*Legend*

- Road  
 Railroad  
 Fence  
 Drainage/Water

*Pile Terrain Model  
Elevation Range (Feet)*

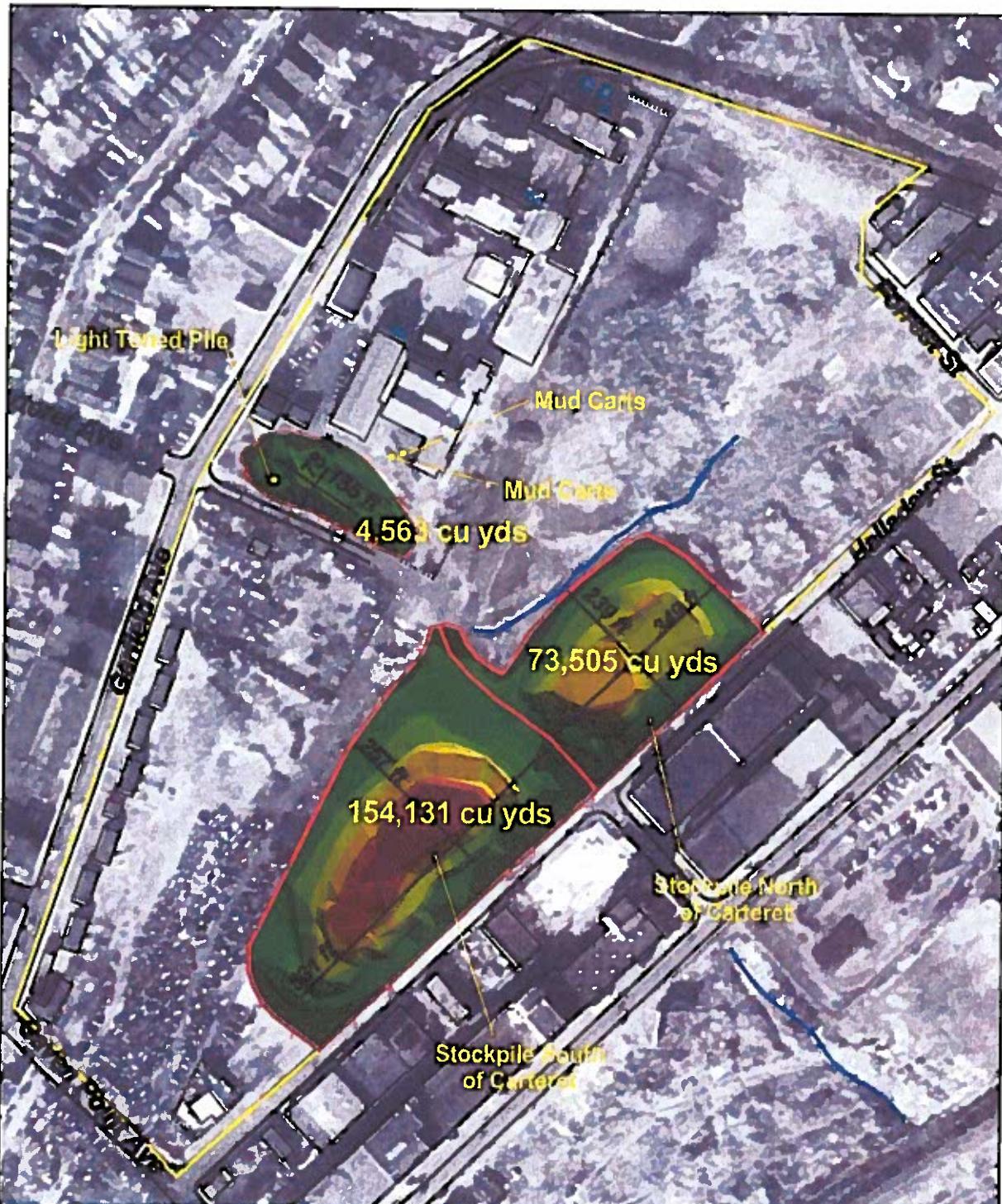
84.701 - 95.066
74.336 - 84.701
63.971 - 74.336
53.606 - 63.971
43.242 - 53.606
32.877 - 43.242
22.512 - 32.877
12.147 - 22.512
-0.765 - 12.147

Underlying Image  
PPGNPR1080693-976

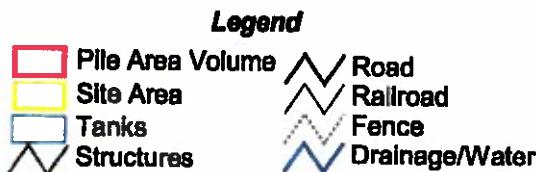


80 0 80 160 Feet

AERO-DATA CORP.  
REMOTE SENSING SYSTEMS  
LAND SURVEYING  
AERIAL PHOTOGRAPHIC INTERPRETATION  
GEOPAKAGING



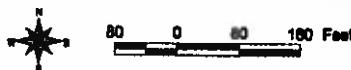
12/5/1953  
Jersey City, NJ  
Photo Source: Interscan



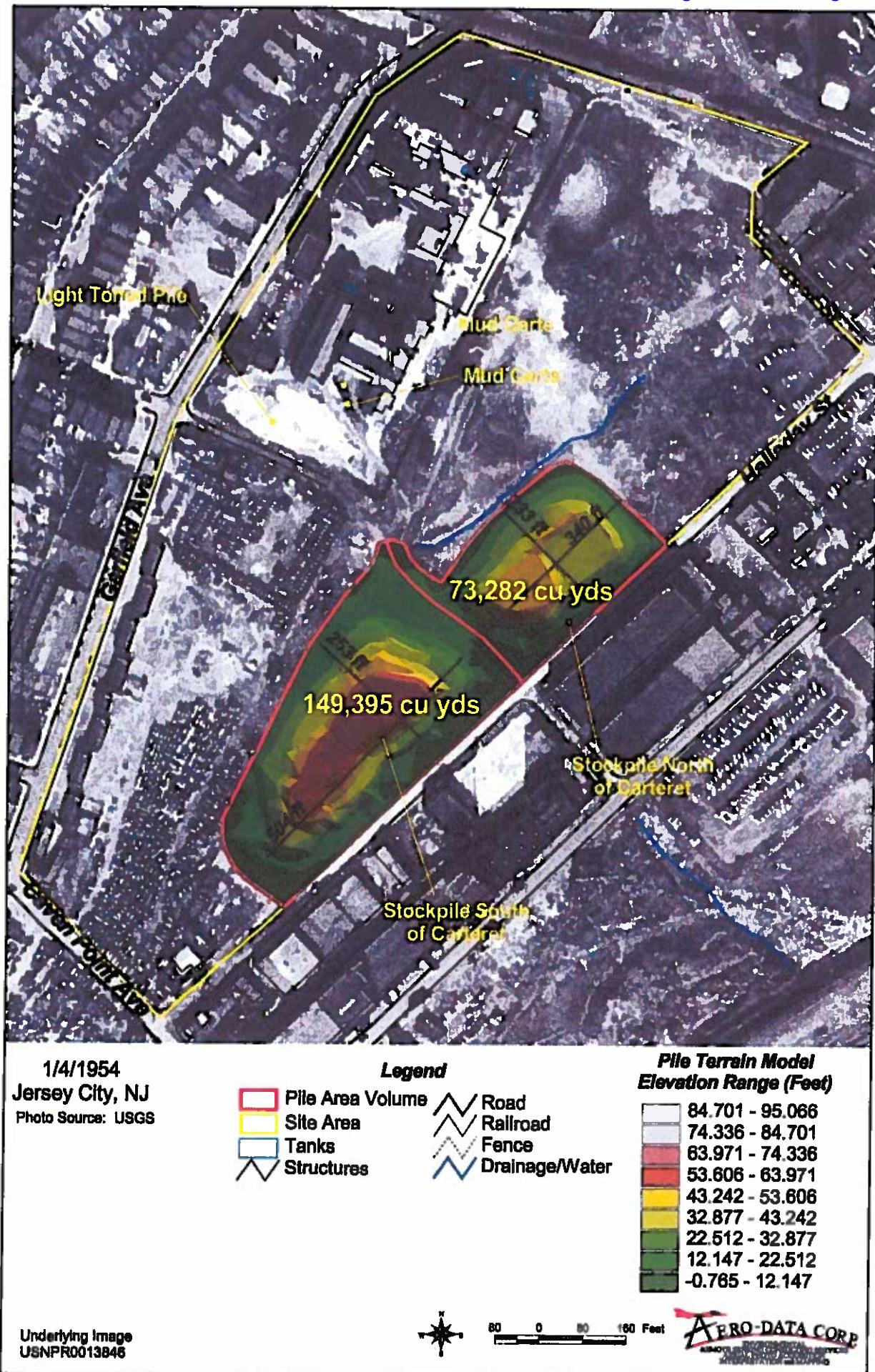
**Pile Terrain Model  
Elevation Range (Feet)**

84.701 - 95.066
74.336 - 84.701
63.971 - 74.336
53.606 - 63.971
43.242 - 53.606
32.877 - 43.242
22.512 - 32.877
12.147 - 22.512
-0.765 - 12.147

Underlying Image  
PPGNPR1080893-876  
PPGNPR00448094-112



**AERO-DATA CORP.**  
AERIAL SURVEYING & IMAGE PROCESSING





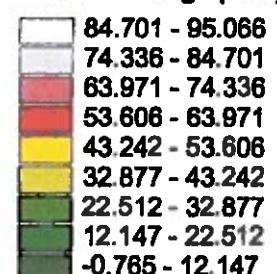
2/18/1954  
Jersey City, NJ  
Photo Source: USGS



*Legend*



*Pile Terrain Model  
Elevation Range (Feet)*

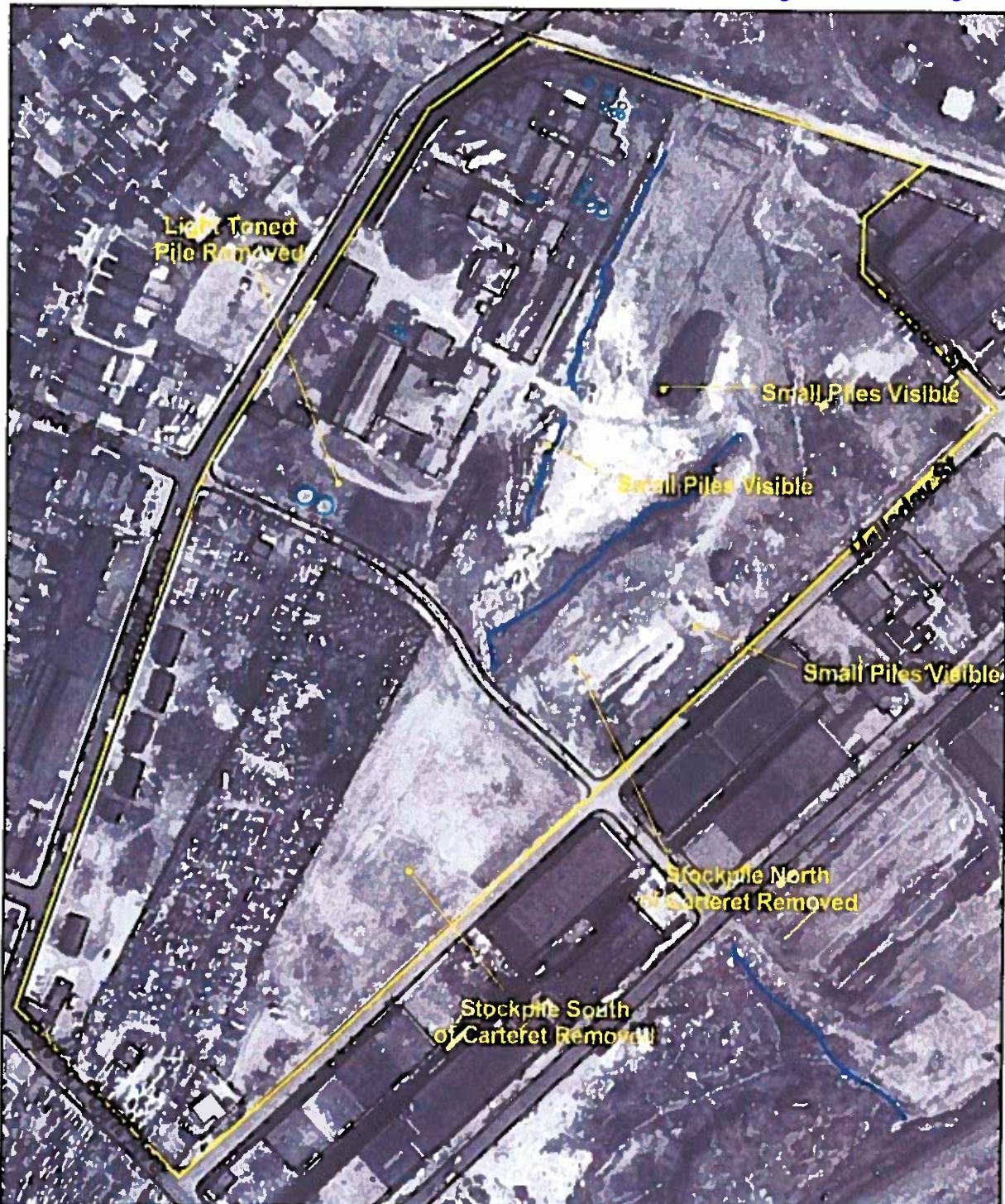


Underlying Image  
PPGNPR1080693-976



80 0 80 160 Feet

**AERO-DATA CORP.**  
REMOTE SENSING  
ENVIRONMENTAL SERVICES  
INTERPRETATION AND MAPPING



Jersey City, NJ  
Photo Source: COLEAST

*Legend*

	Pile Area Volume
	Site Area
	Tanks
	Structures

Road  
 Railroad  
 Fence  
 Drainage/Water



80 0 80 160 Feet



4/16/1959  
Jersey City, NJ  
Photo Source: Robinson

Legend	
	Pile Area Volume
	Site Area
	Tanks
	Structures
	Road
	Railroad
	Fence
	Drainage/Water

Underlying Image  
USNPR0013848

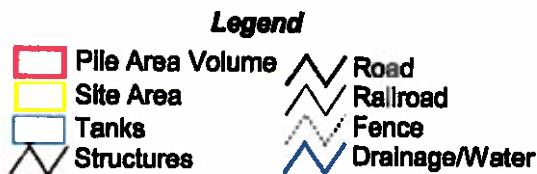


80 0 80 160 Feet

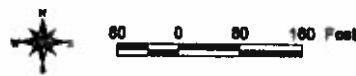
**AERO-DATA CORP.**  
AERIAL SURVEY  
PHOTOGRAPHIC SERVICES



4/12/1961  
Jersey City, NJ  
Photo Source: TXAERO



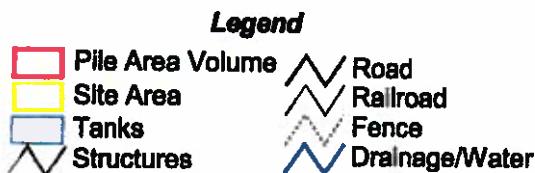
Underlying Image  
PPGNPR0024487



AERO-DATA CORP.  
AERIAL SURVEYORS



5/7/1962  
Jersey City, NJ  
Photo Source: Intrasearch





11/12/1962  
Jersey City, NJ  
Photo Source: NOS

*Legend*

Pile Area Volume	Site Area
Tanks	Structures
Road	Railroad
Fence	Drainage/Water

Underlying Image  
PPGNPR0047271



80 0 80 160 Feet

AERO-DATA CORP.  
AERIAL SURVEY SERVICES



1/14/1963  
Jersey City, NJ  
Photo Source: Robinson

Legend	
Pile Area Volume	Road
Site Area	Railroad
Tanks	Fence
Structures	Drainage/Water

Underlying Image  
USNPR0013850



80 0 80 160 Feet

AERO-DATA CORP.  
REMOTE SENSING & IMAGE PROCESSING  
INFORMATION SYSTEMS



6/20/1966  
Jersey City, NJ  
Photo Source: NOS

*Legend*  
 Site Area

Underlying Image  
PPGNPR00446094-112



80 0 80 160 Feet

AERO-DATA CORP.  
REMOTE SENSING SYSTEMS  
DATA PROCESSING



2007 Imagery  
Jersey City, NJ  
Photo Source: USGS

*Legend*  
■ Site Area



80 0 80 160 Feet

AERO-DATA CORP.

*Historical  
Oblique Aerial Photos*



Oblique Photograph  
102922  
Jersey City, NJ  
Photo Source: FAIRCHILD

Photo Taken After 4/28/1947

Underlying Image  
PPGNPR102824

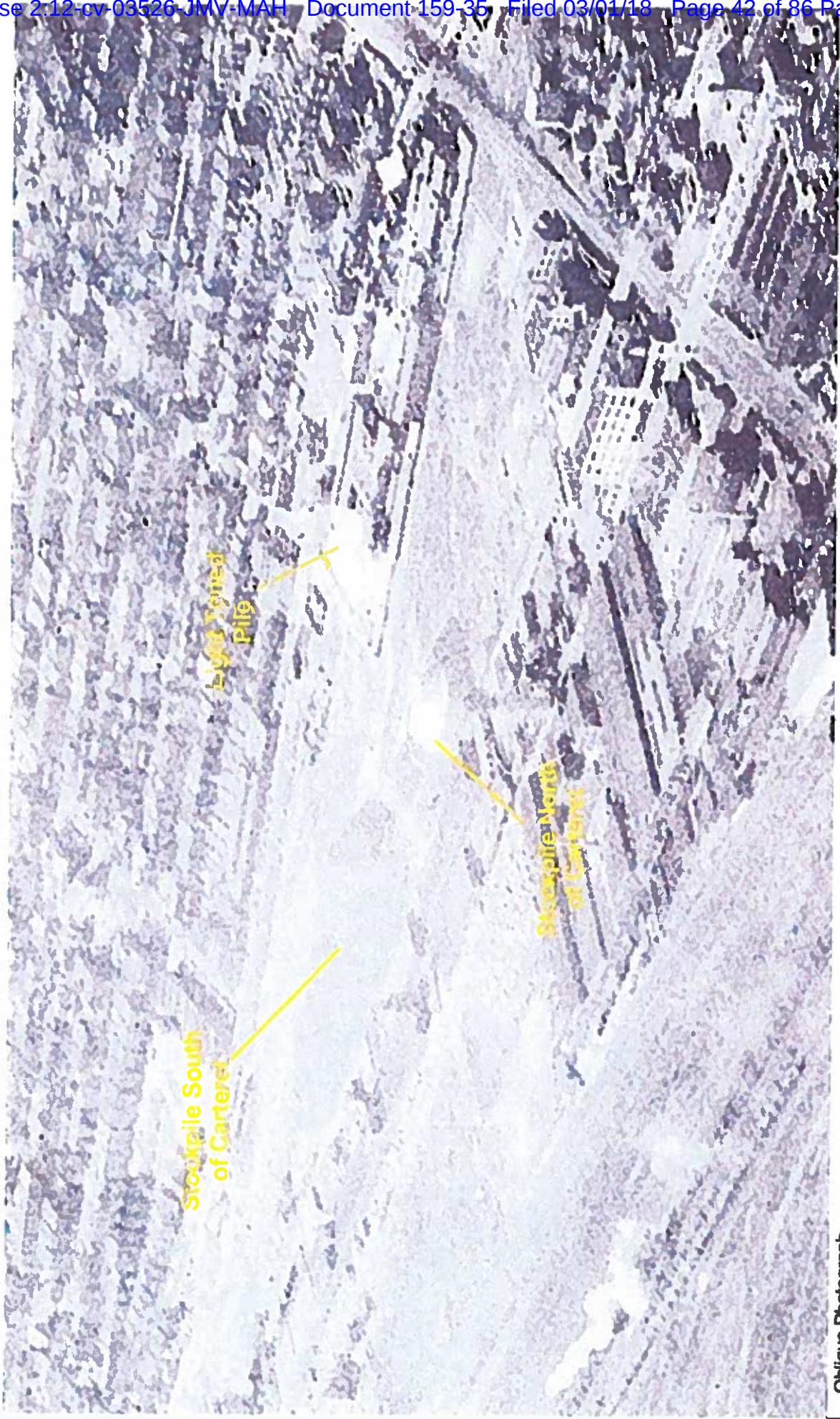
AERO-DATA CORP.  
PHOTOGRAPHIC SERVICES INC.





Oblique Photograph  
103164  
Jersey City, NJ  
Photo Source: FAIRCHILD

Underlying Image  
PPGNFR1028246



Oblique Photograph  
103165  
Jersey City, NJ  
Photo Source: FAIRCHILD

Underlying Image  
PPGNPR1028248

AERO-DATA CORP.  
© 2008



Oblique Photograph  
103173  
Jersey City, NJ  
Photo Source: FAIRCHILD

Photo Taken After 4/28/1947

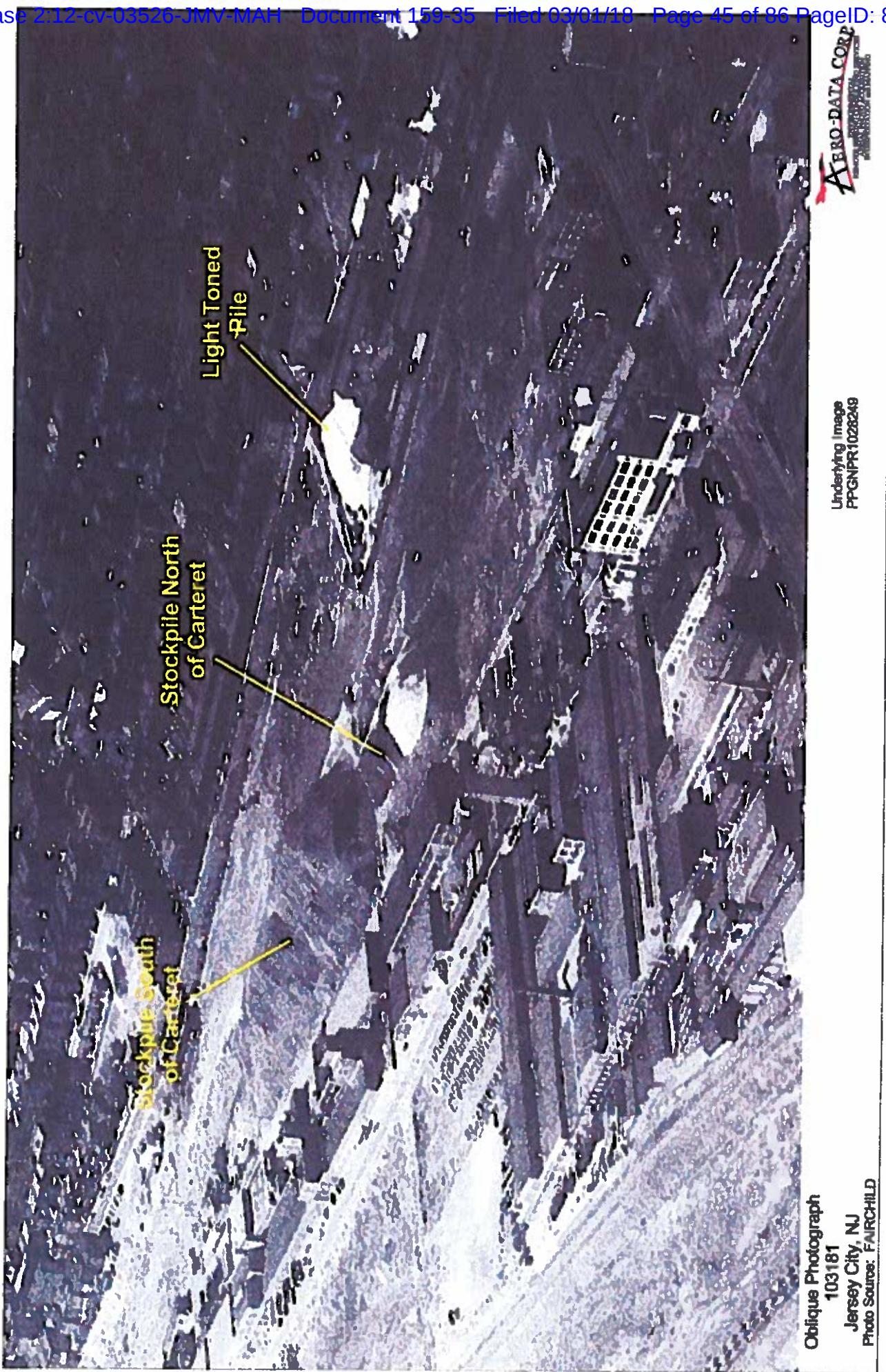
Underlying Image  
PPGNPR1028241

AERO-DATA CORP.  
PHOTOGRAPHIC



Oblique Photograph  
103180B  
Jersey City, NJ  
Photo Source: FAIRCHILD

AERO-DATA CORP.  
103180B  
103180B  
103180B

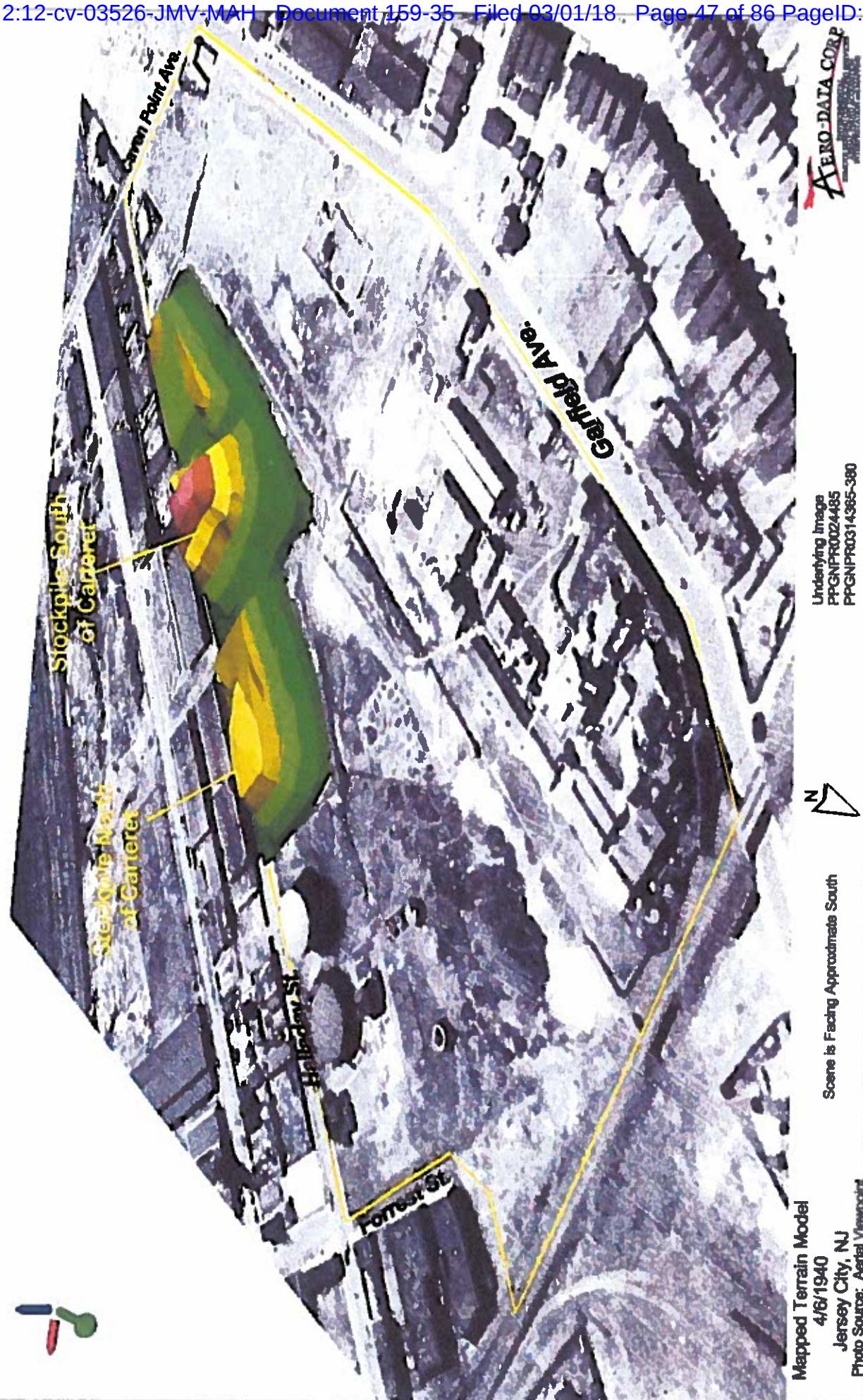


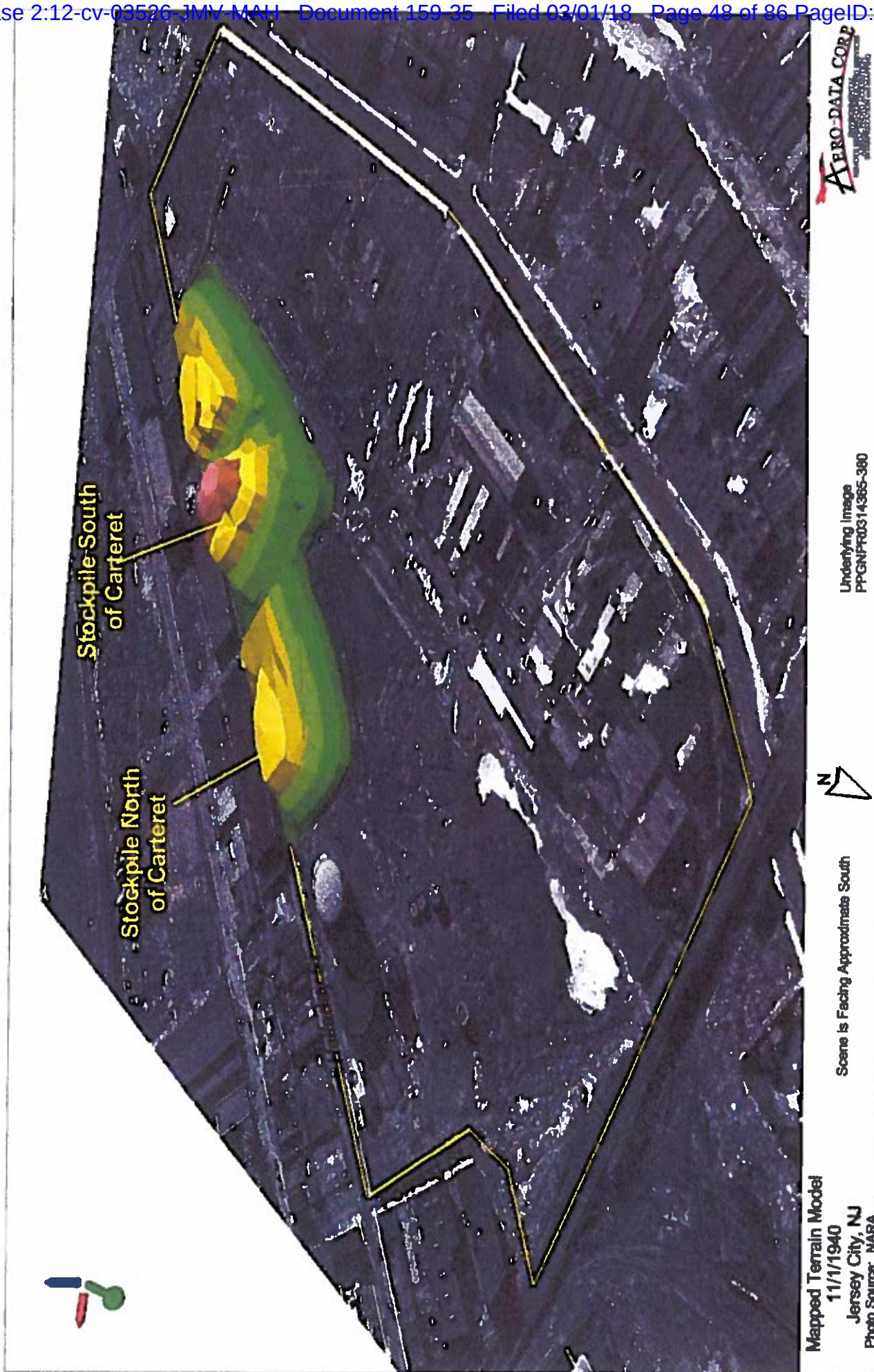
Oblique Photograph  
103181  
Jersey City, NJ  
Photo Source: FAIRCHILD

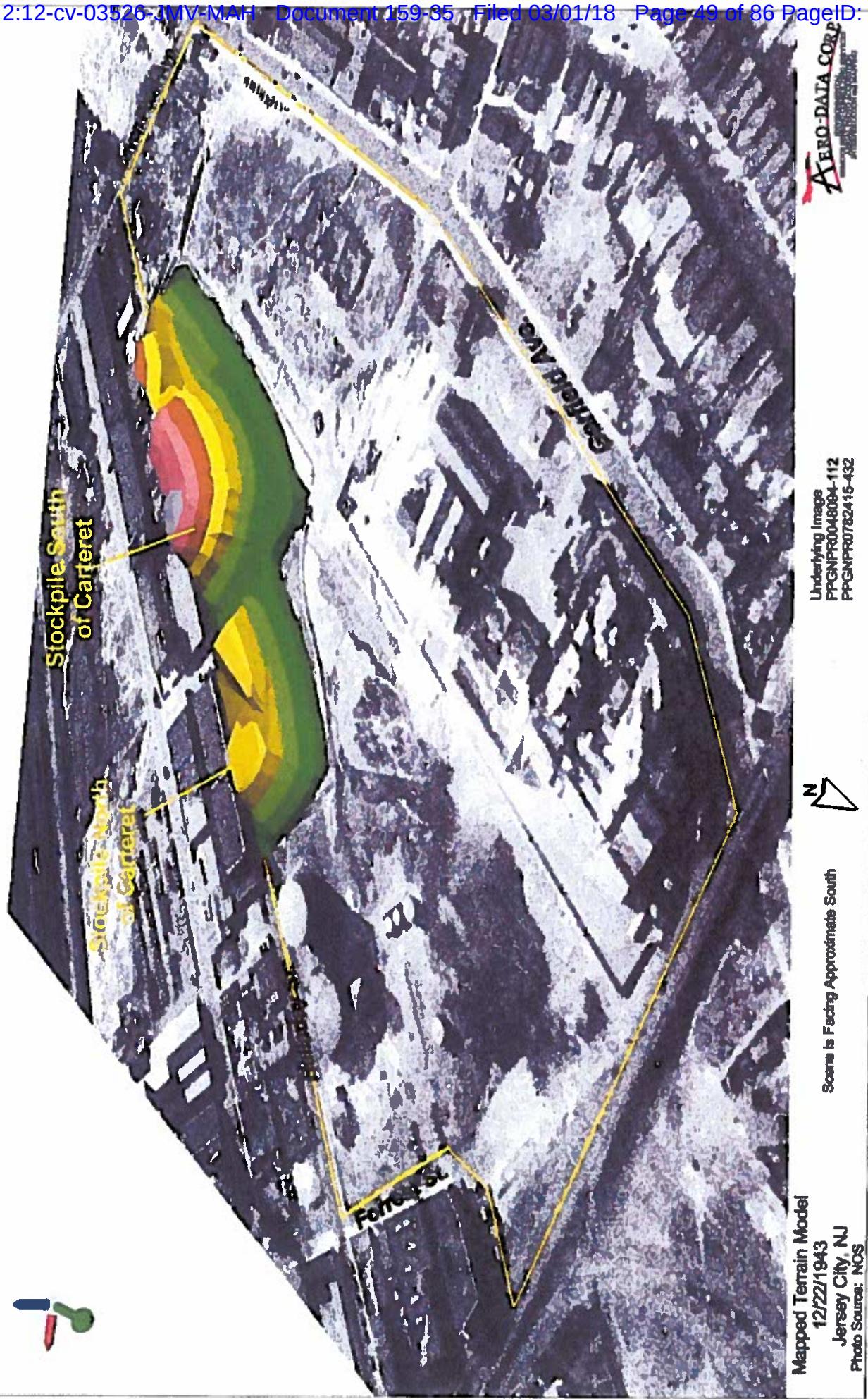
Underlying Image  
PPGNPR1028249

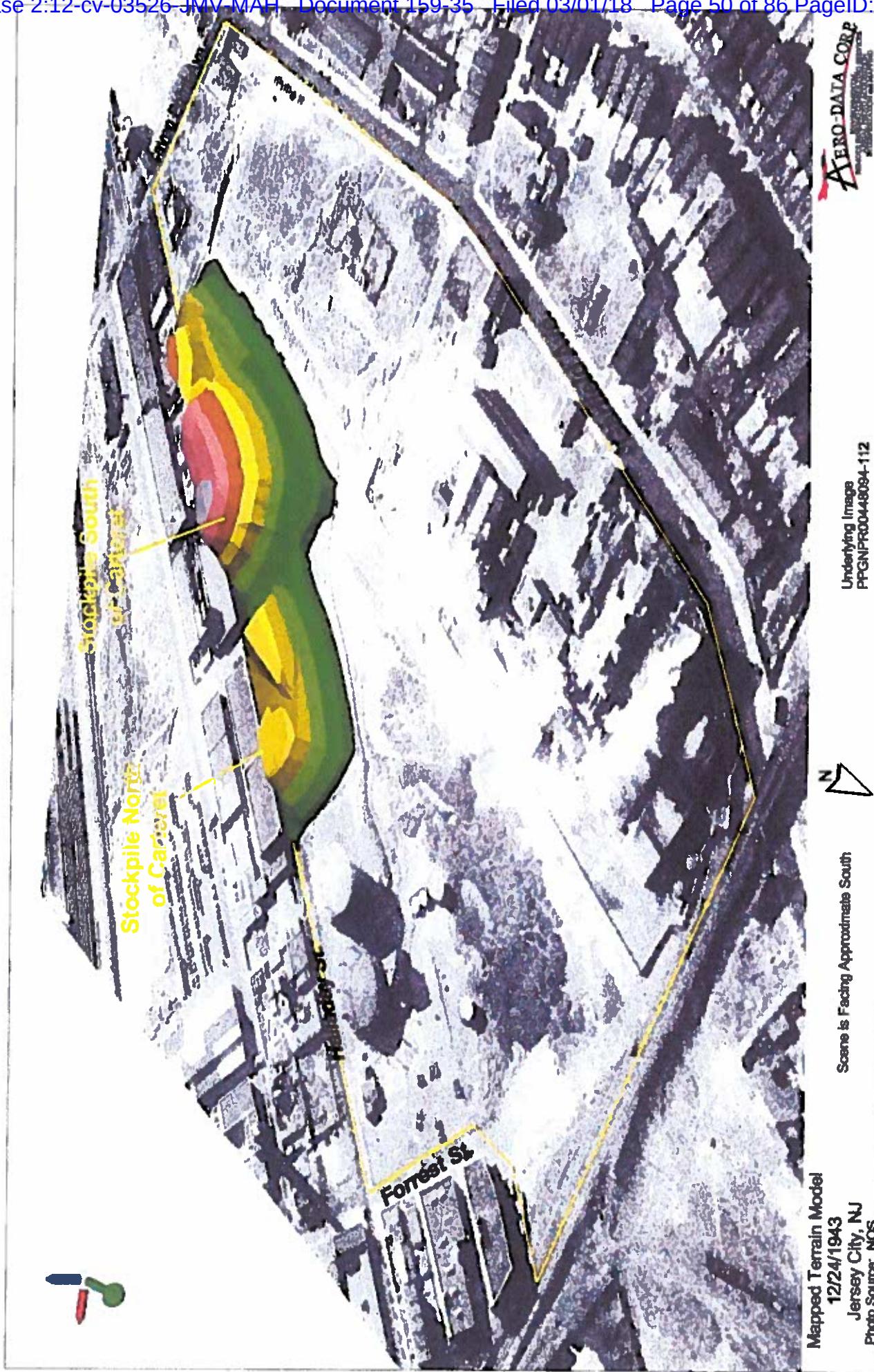
~~AERO-DATA CORP.~~

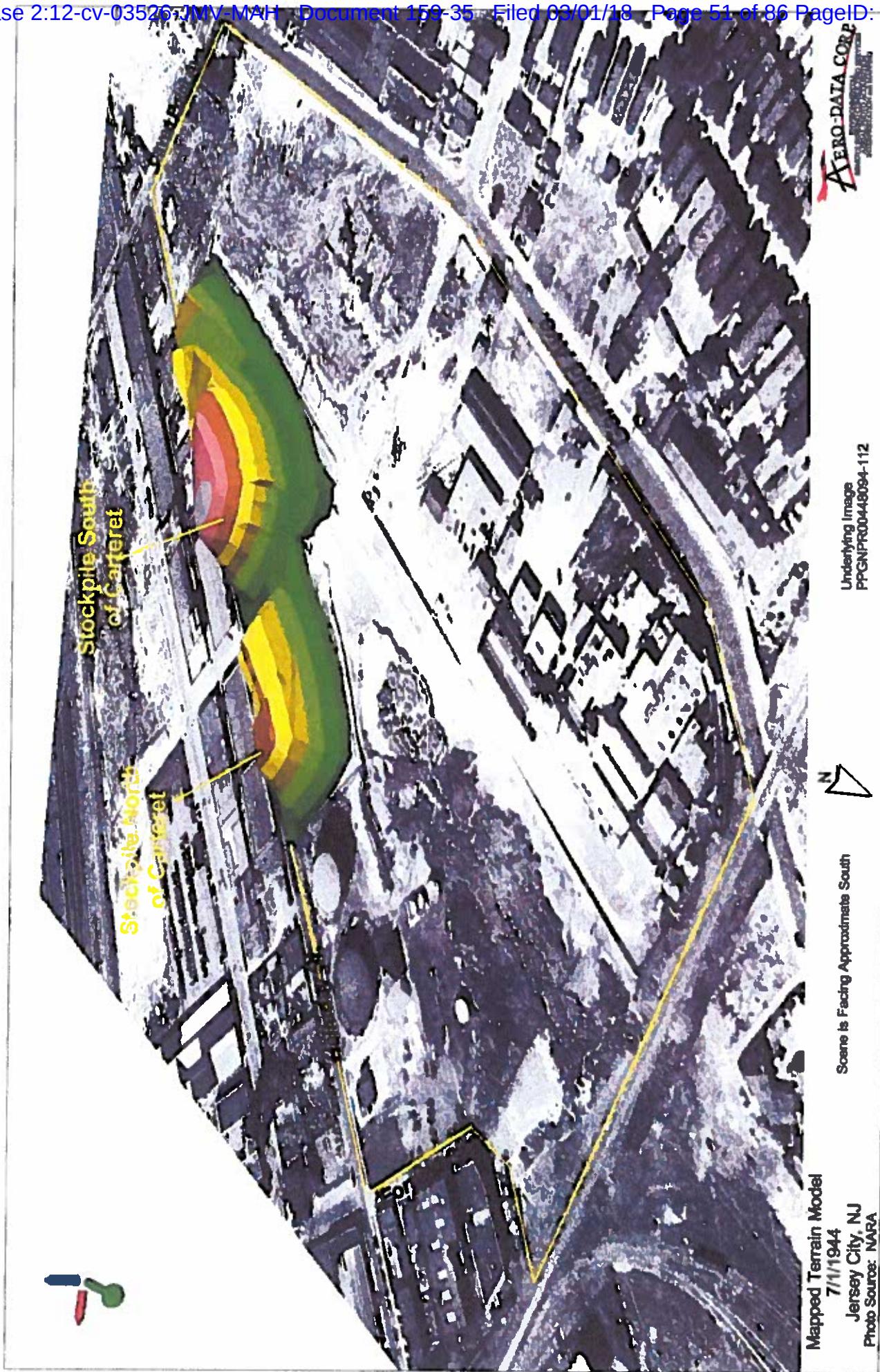
***Stockpile Terrain Model  
Oblique Views***

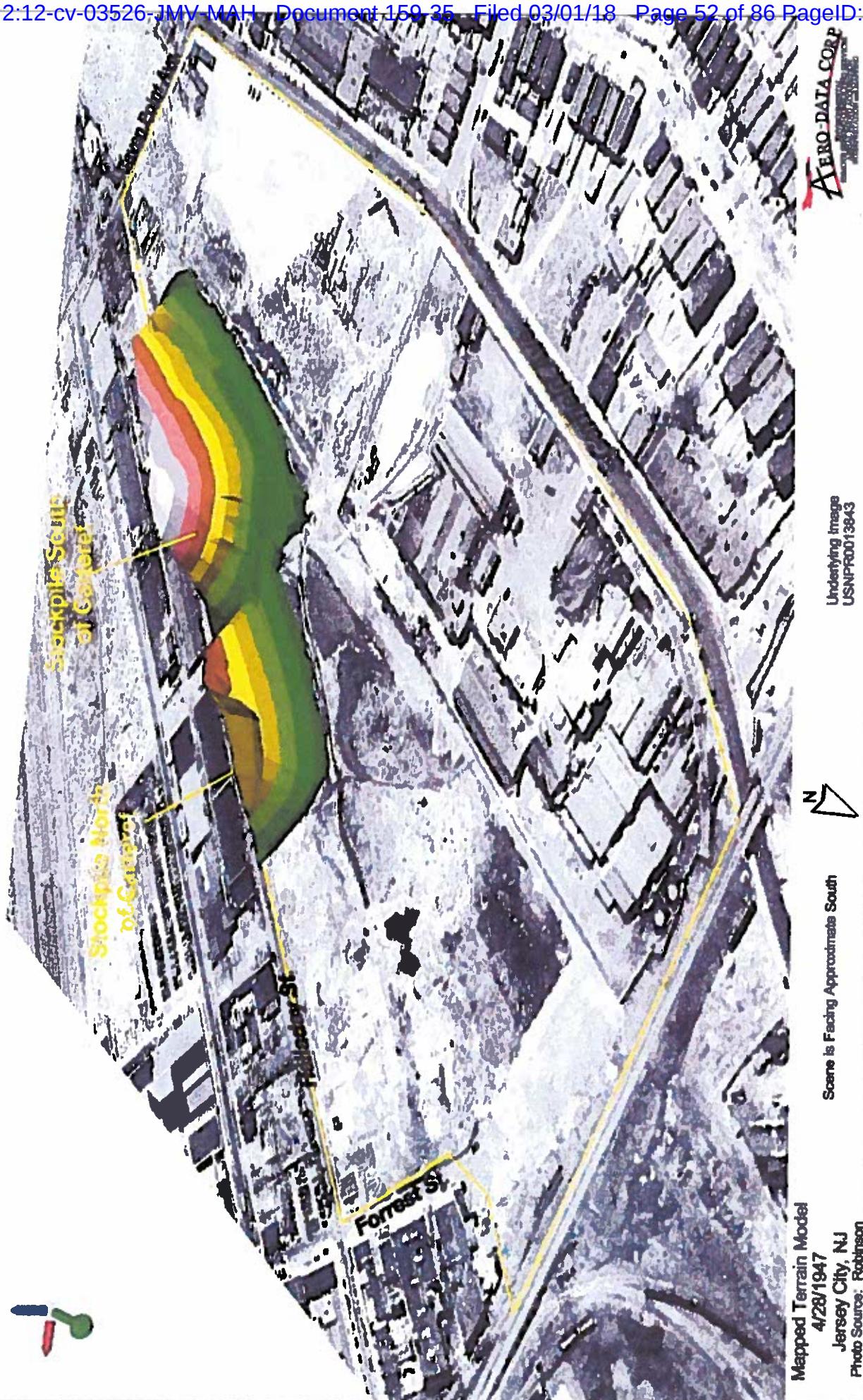


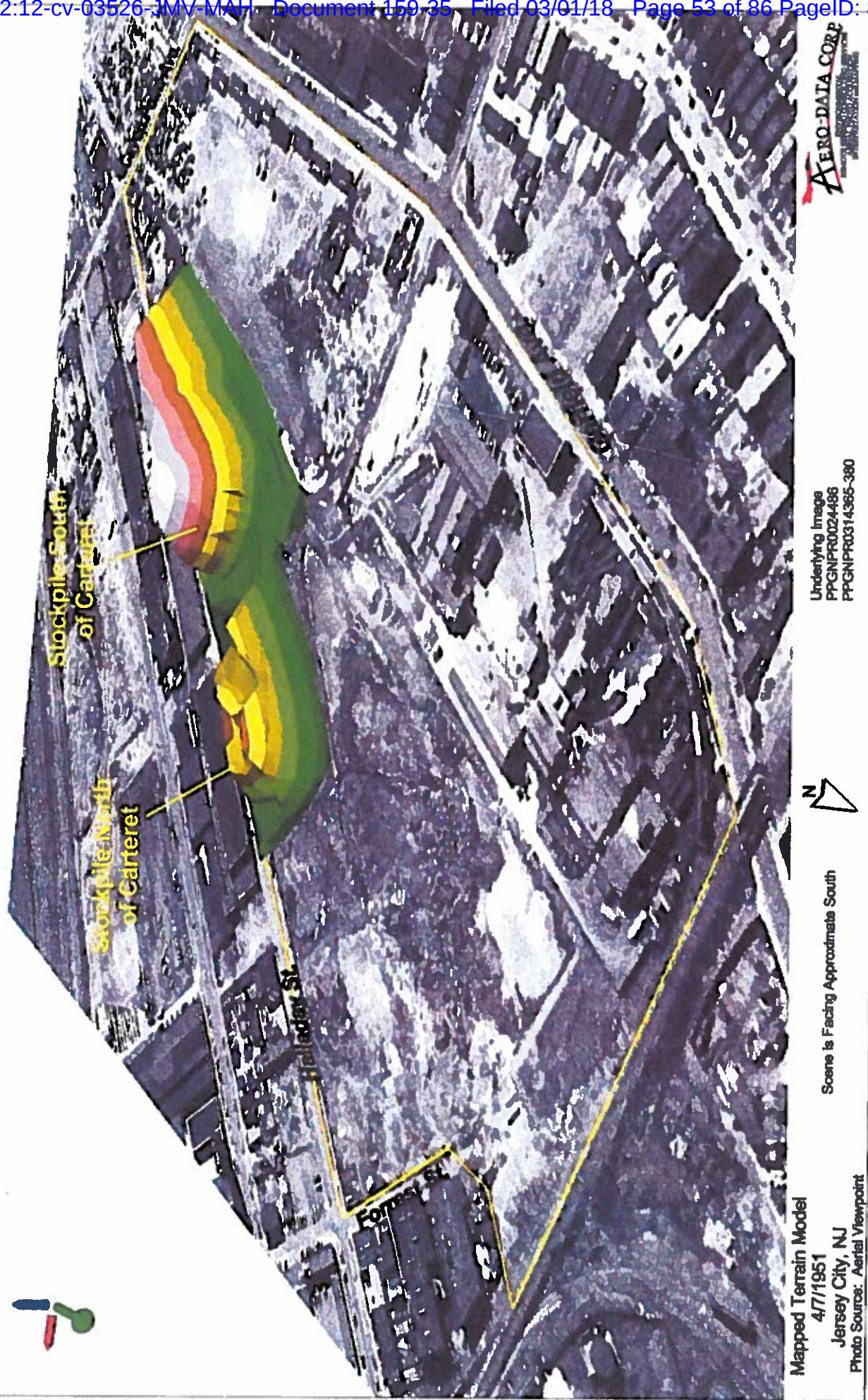


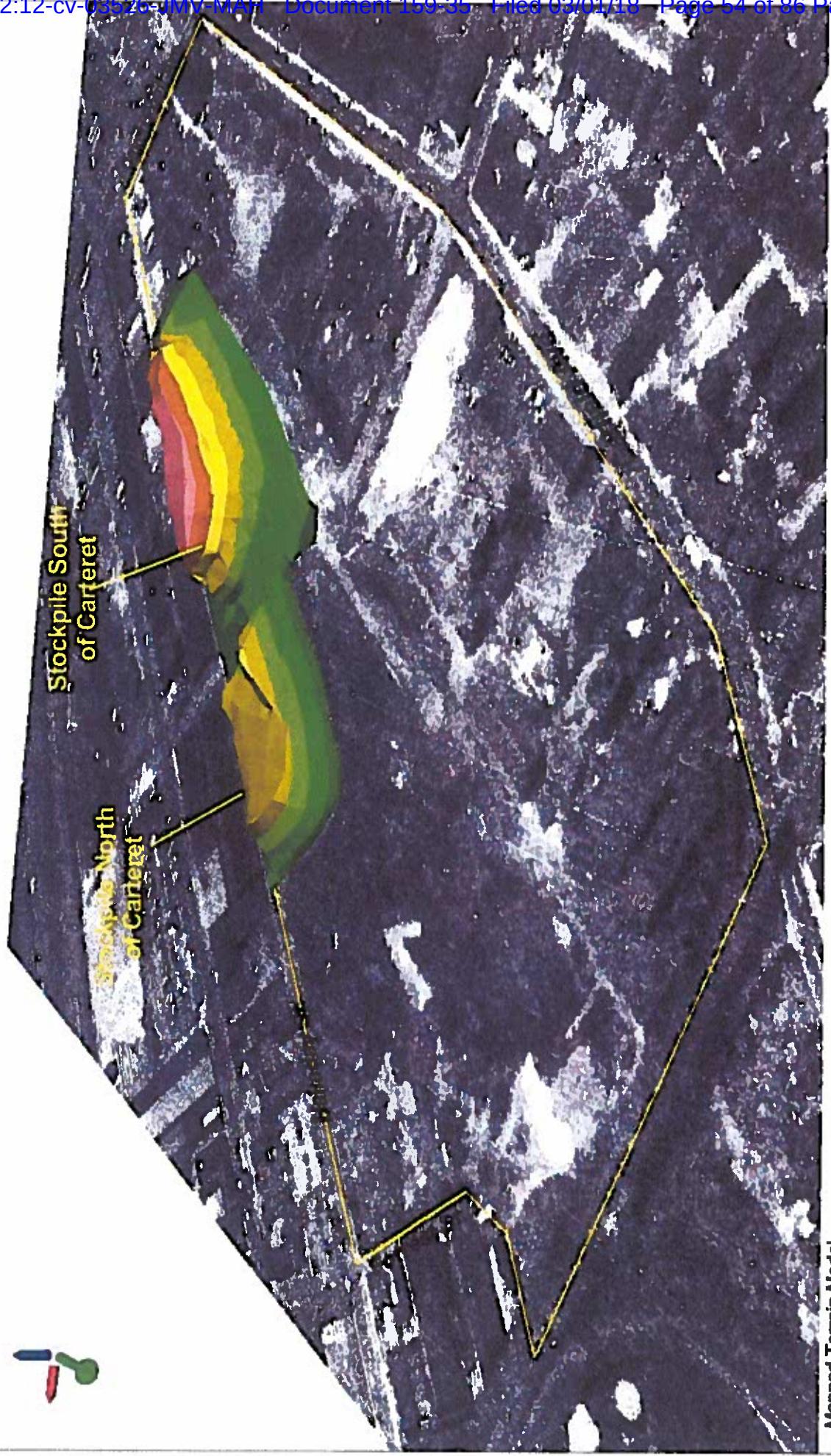












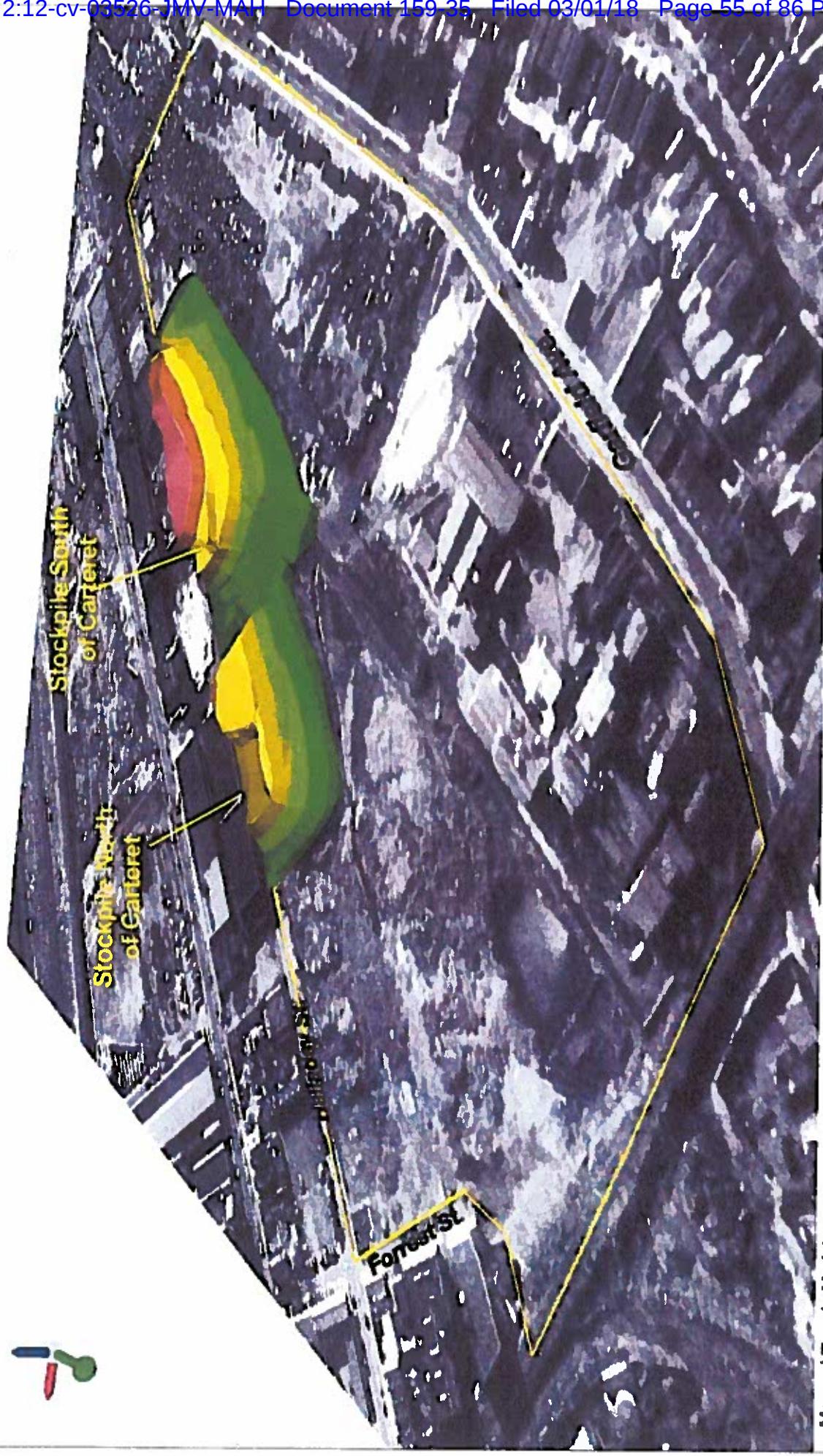
Mapped Terrain Model  
6/8/1953  
Jersey City, NJ  
Photo Source: NARA

Underlying Image  
PPGNPR1000693-976



Scene Is Facing Approximate South

~~AERO-DATA CORP~~



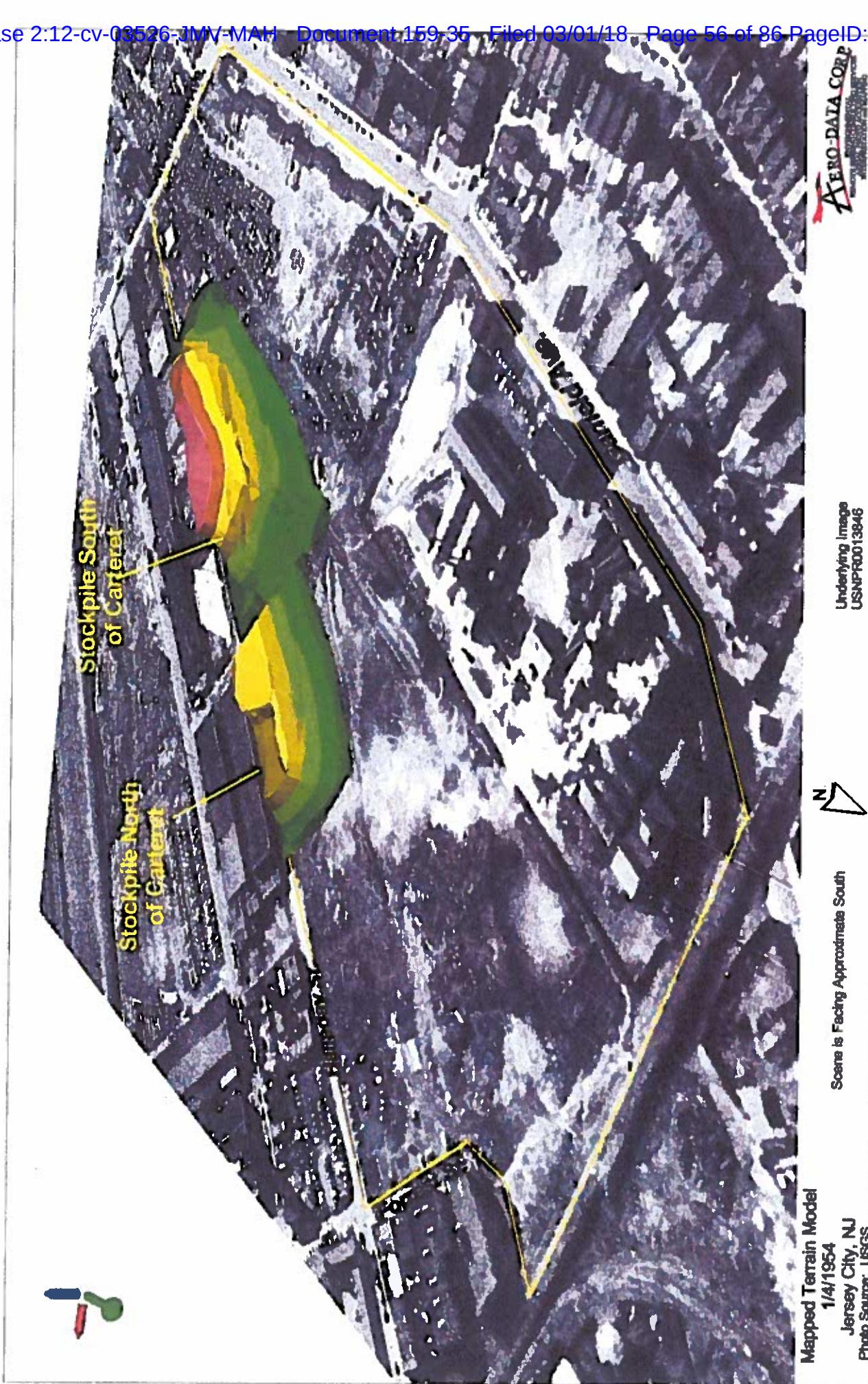
Mapped Terrain Model  
12/5/1953  
Jersey City, NJ  
Photo Source: Intrasearch

Underlying Image  
PPGNPR1080893-976  
PPGNPR00448084-112

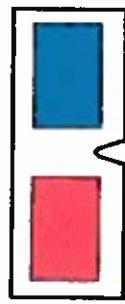


Scene is Facing Approximate South

AERO-DATA CORP.  
AERIAL SURVEYORS



## *Anaglyph 3-D Images*





3-D Image  
4/6/1940  
Jersey City, NJ  
Photo Source: TXAERO

Use Glasses for  
Stereo Viewing

N  
Approximate Scale and North Arrow

AERO-DATA CORP.  
STEREOVIEWER

Underlying Image  
PPGNIPR002485  
PPGNIPR0314385-380

100 0 100 200 Feet



3-D Image  
11/1/1940  
Jersey City, NJ  
Photo Source: NARA

3-D Image  
11/1/1940  
Jersey City, NJ  
Photo Source: NARA



AERO-DATA CORP.  
Underlying Image  
PPGNPR0314365-380  
Approximate Scale and North Arrow



3-D Image  
12/22/1943  
Jersey City, NJ  
Photo Source: NOS

Use Glasses for  
Stereo Viewing

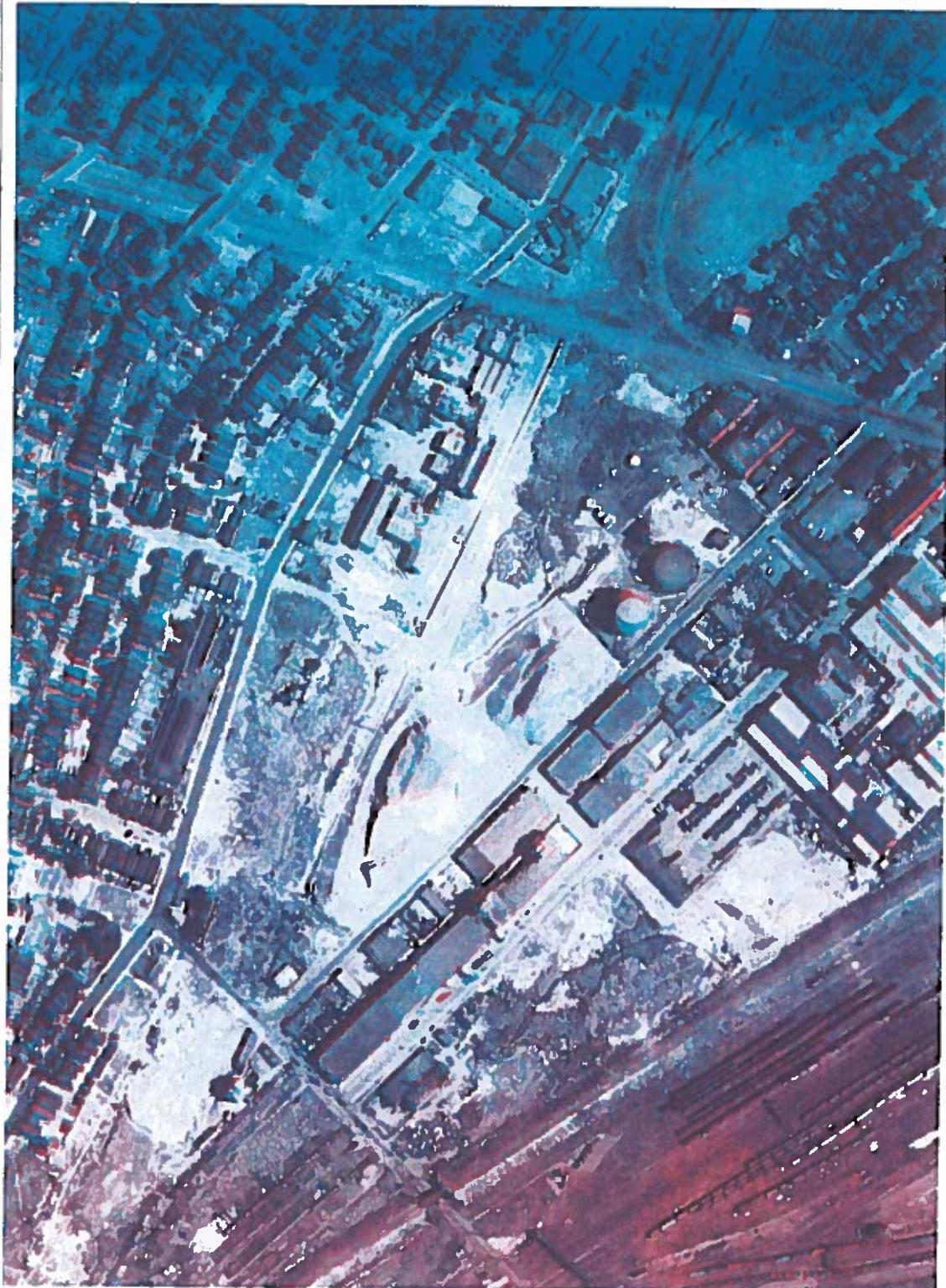
N  
Approximate Scale and North Arrow

Underlying Image  
PPGNPRA048034-112  
PPGNPRA0782415-432

AERO-DATA CORP.  
STEREOPHOTOGRAMS



~~AERO-DATA CORP.~~



3-D Image  
7/1/1944  
Jersey City, NJ  
Photo Source: NARA



AERO-DATA CORP.  
Underlying Image  
PPG/NPR00448094-112  
Approximate Scale and North Arrow

~~AERO-DATA CORP.~~



3-D Image  
4/28/1947  
Jersey City, NJ  
Photo Source: ROBINSON



N  
Approximate Scale and North Arrow

Underlying Image  
USNPP0013843

100 0 100 200 Feet



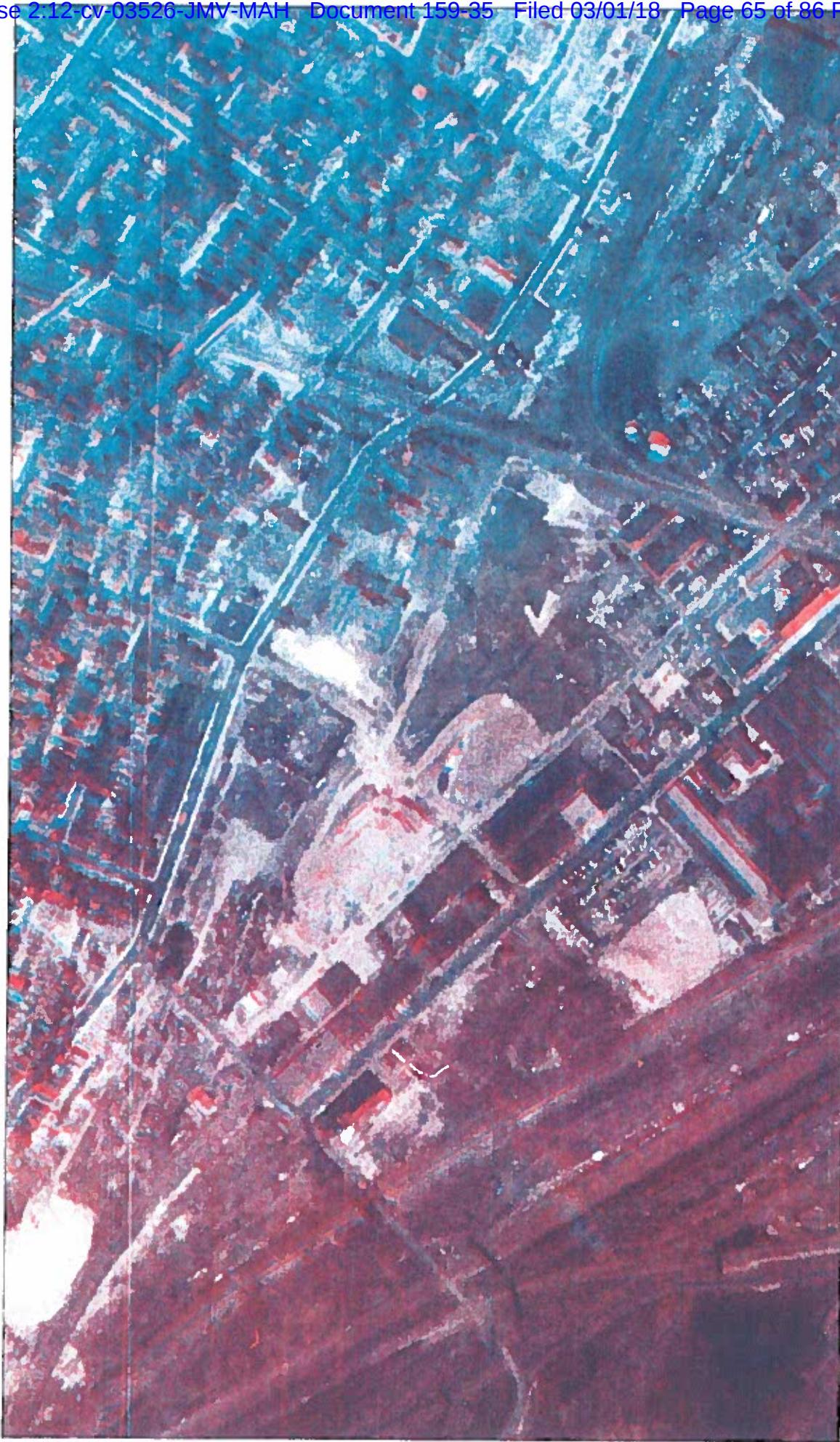
3-D Image  
4/7/1951  
Jersey City, NJ  
Photo Source: TXAERO

Use Glasses for  
Stereo Viewing

N  
Approximate Scale and North Arrow

Underlying Image  
PPGNIPR03024486  
PPGNIPR0314365-380  
100 0 100 200 Feet

AERO-DATA CORP.  
TXAERO



3-D Image  
6/8/1953  
Jersey City, NJ  
Photo Source: NARA

Use Glasses for  
Stereo Viewing

N  
Appropriate Scale and North Arrow

100 0 100 200 Feet  
Underlying Image  
PPGNPR1080893-876

AERO-DATA CORP.  
AERIAL SURVEYORS  
Underlying Image  
PPGNPR1080893-876



3-D Image  
12/5/1953  
Jersey City, NJ  
Photo Source: INTRASEARCH



Use Glasses for  
Stereo Viewing

AERO-DATA CORP.  
STEREO MAPS

Underlying Image  
PPGNPR1050593-976  
PPGNPR00448094-112

100 0 100 200 Feet  
Approximate Scale and North Arrow





3-D Image  
1/4/1954  
Jersey City, NJ  
Photo Source: USGS

Use Glasses for  
Stereo Viewing

N  
Approximate Scale and North Arrow

AERODATA CORP.  
Underlying Image  
USNPR0013846

100 0 100 200 Feet



3-D Image  
2/18/1954  
Jersey City, NJ  
Photo Source: USGS

Use Glasses for  
Stereo Viewing

N  
Approximate Scale and North Arrow

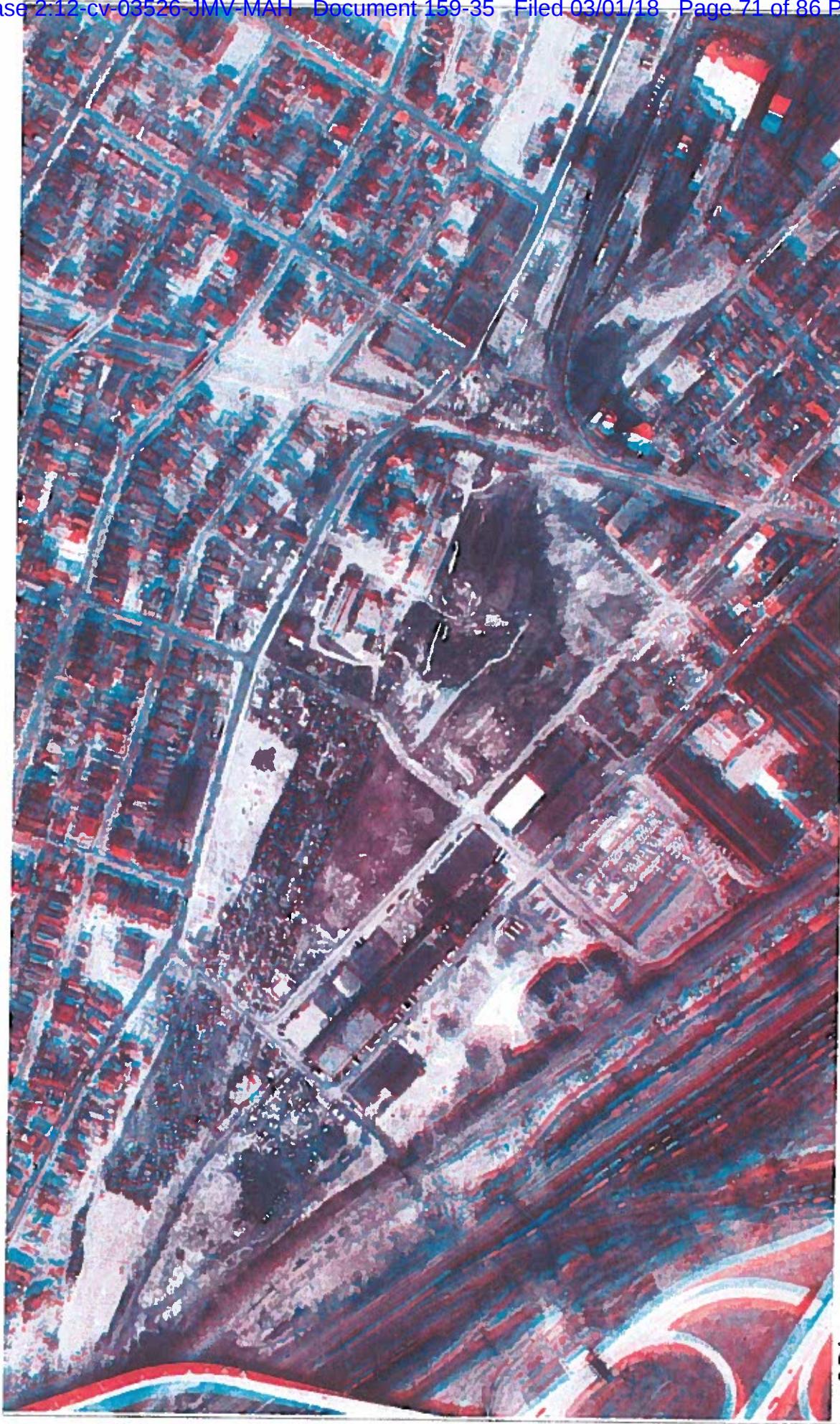
100 0 100 200 Feet

Underlying Image  
PPGNPR1060683-976

AERO-DATA CORP.  
PHOTOGRAPHIC CORPORATION OF AMERICA







3-D Image  
4/12/1961  
Jersey City, NJ  
Photo Source: TXAERO

N  
Use Glasses for  
Stereo Viewing

100 0 100 200 Feet  
Approximate Scale and North Arrow

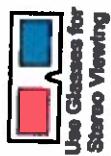
Underlying Image  
PPGNPR0024487

AERO-DATA CORP.  
STEREOVIEWING

~~AERO-DATA CORP.~~  
~~PHOTOGRAPHIC~~



3-D Image  
5/7/1962  
Jersey City, NJ  
Photo Source: INTRASEARCH



Use Glasses for  
Stereo Viewing

N  
Approximate Scale and North Arrow

Underlying Image  
PPGNPR1000693-976

100 0 200 Feet



3-D Image  
11/12/1962  
Jersey City, NJ  
Photo Source: NOS

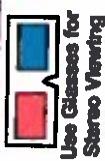
Use Glasses for  
Stereo Viewing

N  
Underlying Image  
PPGNPR0047271  
Approximate Scale and North Arrow  
100 0 100 200 Feet

AERO-DATA CORP.  
AERIAL SURVEYORS



3-D Image  
1/14/1963  
Jersey City, NJ  
Photo Source: ROBINSON



Underlying Image  
USNPR0013650  
100 0 100 200 Feet  
Approximate Scale and North Arrow

AERO-DATA CORP.  
PHOTOGRAPHIC



3-D Image  
6/20/1986  
Jersey City, NJ  
Photo Source: NOS

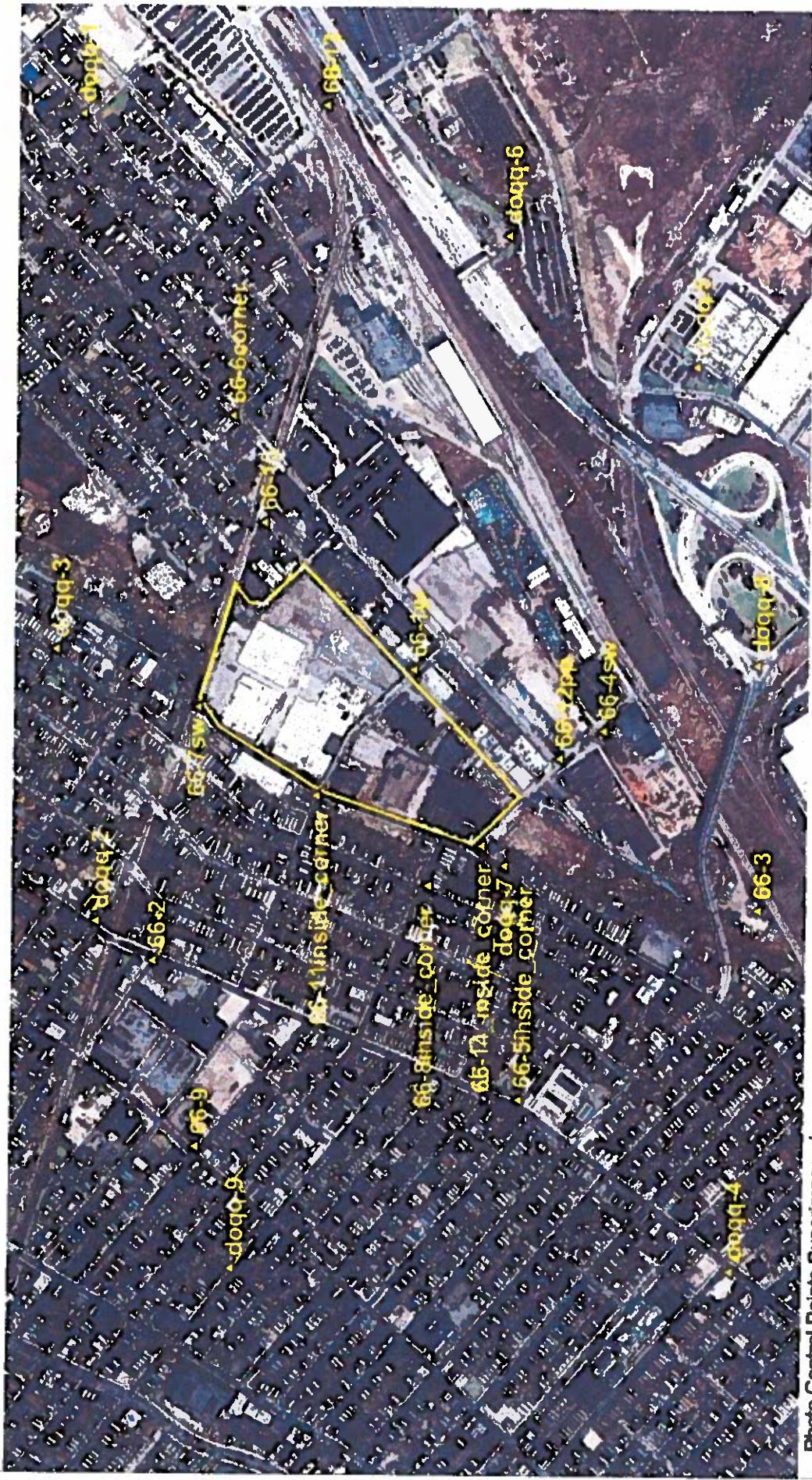


Aero-Data Corp.  
Underlying Image  
PPGNPR0048034-112

100 0 100 200 Feet  
Approximate Scale and North Arrow



***Control Points and  
Check Points***



AERO-DATA CORP.

Photo Control Points Superimposed  
on 2007 Imagery

Photo Source: USGS

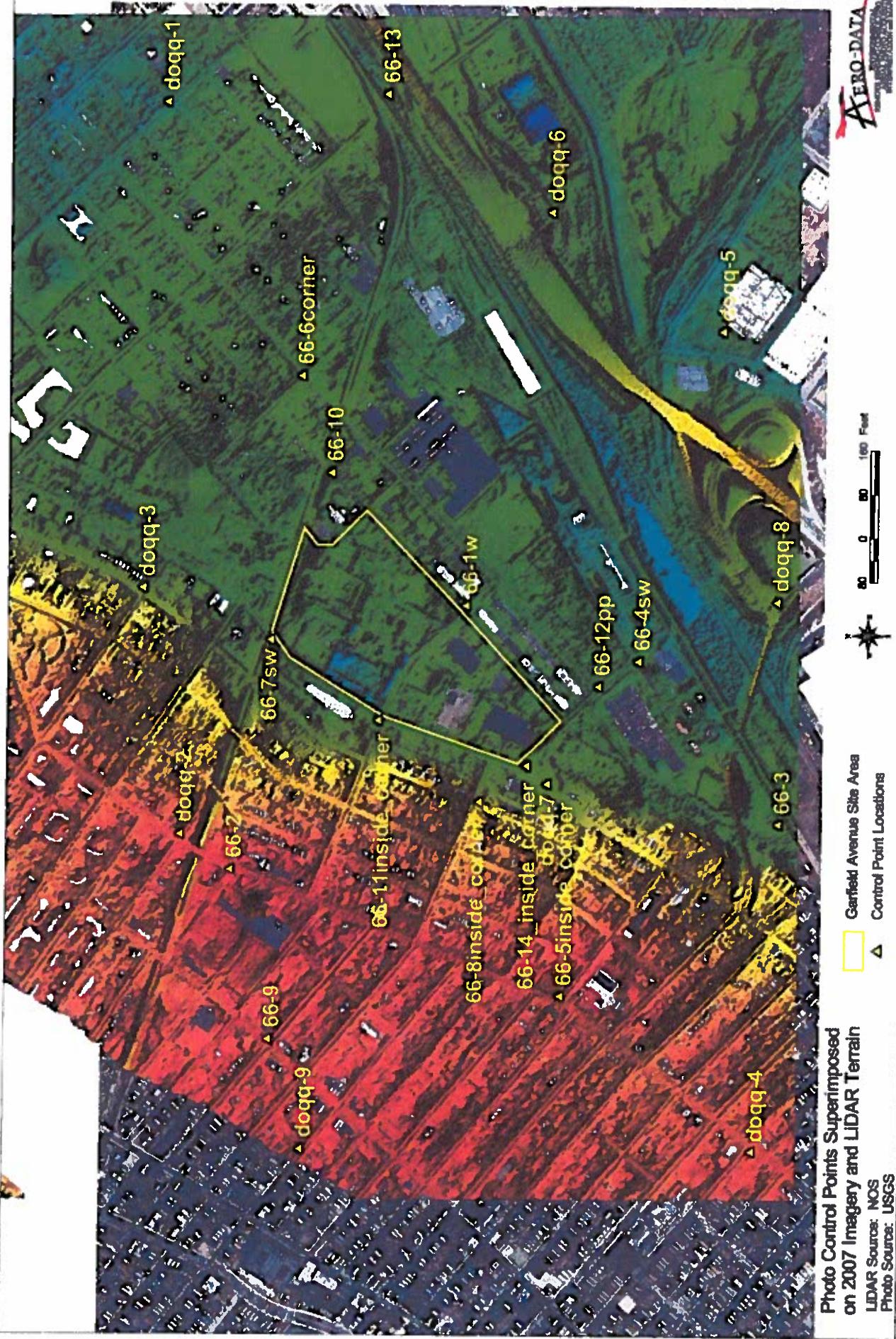
Garfield Avenue Site Area  
Control Point Locations

66-10p10

66-11p10

66-12p10

66-13p10



## Attachment C

### Randall Wayne Grip, Vice-President, Aero-Data Corporation

**Education:** Louisiana State University, BS in Geography (1996); Mapping Sciences emphasis.

Mr. Grip's course work included graduate level courses in photo interpretation, GIS mapping, GPS surveying and remote sensing with an emphasis in environmental applications.

#### Professional Experience:

September 2003 to Present    Aero-Data Corporation, Baton Rouge, LA,  
Vice-President

As company vice-president, Mr. Grip has directed all aspects of projects including photographic printing, photo interpretation, photogrammetry, and image research and acquisition. He has experience in digital image production and geographic information systems using Digital Photogrammetric Workstations and ESRI GIS. Mr. Grip has been involved in approximately two hundred mapping projects while at Aero-Data. During this time he has been trained and supervised by Wayne M. Grip, Aero-Data's co-founder and principal owner.

Aero-Data specializes in aerial photography and mapping, environmental photointerpretation, and geographic information systems. The company was founded in 1983. It has completed over fifty oil field studies since its founding. Aero-Data has a complete photo laboratory and two airplanes as well as aerial mapping cameras, GPS surveying and navigation receivers, and digital stereoplotter/photointerpretation work stations.

Aero-Data's projects number over 700 sites in 32 different states, to date. They include historical aerial photography-based hazardous waste site investigations; oil field investigations; environmental audits; accident site investigations; annual site documentation using aerial photography and video; contour mapping of plant sites; stockpile volume determinations; geographic information systems; and coastal zone erosion studies.

Aero-Data's client list includes many of the major corporations and law firms in the United States as well as government agencies such as the U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency, U.S. Soil Conservation Service, U.S. Department of Justice, the Louisiana Department of Transportation and Development, the Louisiana Department of Natural Resources, and the Louisiana Department of Environmental Quality.

July 1995 to September 2003    Aero-Data Corporation, Baton Rouge, LA,  
Project Manager III

August 1990 to July 1995    Aero-Data Corporation, Baton Rouge, LA,  
Photolab Specialist

While obtaining his university degree, Mr. Grip worked as a photo lab specialist and aerial camera operator for Aero-Data Corporation.

## Attachment D

### *Expert Testimony of the Past Five Years and Publications of Randall Grip*

#### Trial Testimony

		Type of Work
11/16/2012	<u>Edward Oneal vs. Thelma Sue Oneal Burcham et al</u> 19 <sup>th</sup> Judicial District Court Parish of East Baton Rouge Case No. C596384 Historical Imagery Review and Mapping	Photointerpretation & Photogrammetry
11/17/2015	<u>William Lane Stephenson, et al v. Wildcat Midstream Caddo, LLC</u> 42nd Judicial District Court Parish of DeSoto Case No. 74,224-A Historical Imagery Review and Mapping	Photointerpretation & Photogrammetry

#### Deposition Testimony

	Type of Work
8/9/2012	<u>Edward Oneal vs. Thelma Sue Oneal Burcham et al</u> 19 <sup>th</sup> Judicial District Court Parish of East Baton Rouge Case No. C596384 Historical Imagery Review and Mapping
2/26/2013	<u>Edward Leblanc vs. Borgwarner Morse Tec Inc. et al</u> Civil District Court for the Parish of Orleans CDC No. 2012-7620, Section:12-H Historical Imagery Review , Mapping, and Plaintiff Geocoding
12/16/2014	<u>Blue Tee Corp. and Gold Fields Mining, LLC v. XTRA Intermodal, Inc., et al.</u> Photointerpretation & Photogrammetry United States District Court for the Southern District of Illinois No. 3:13-cv-00830-DRH Historical Imagery Review, Photointerpretation and Mapping
12/22/2014	<u>Clyde A. Tucker et al vs. Shell Oil Company, et al.</u> Photointerpretation & Photogrammetry 3 <sup>rd</sup> Judicial District for the Parish of Union State of Louisiana Docket No. 42934 Historical Imagery Review, Photointerpretation and Mapping
9/23/2015	<u>Ericsson Inc. et al., v. Ace American Insurance Company, et al.</u> Photointerpretation & Photogrammetry State of Indiana Marion County Superior Court Cause No.: 49D05-0807-PL-030958 Historical Imagery Review, Photointerpretation and Mapping

#### Publications

##### November 2000

Application of Aerial Photography and Photogrammetry in Environmental Forensic Investigations  
Wayne M Grip, Randall W. Grip and Robert D. Morrison  
Journal of Environmental Forensics (2000) 1, 121-129



Randall W. Grip (Vol. I)

Newark, NJ

April 4, 2017

<p style="text-align: center;">Page 22</p> <p>1 site, you know. So we had that listing. You know, 2 I'm not clear on the more modern research that we 3 did, but I think we did some additional research, 4 and sent out requests to vendors to see if they had 5 coverage of the area on this time frame, and then 6 they report back and, you know, and I get a listing 7 of the imagery and I acquire it.</p> <p>8 Q. Did you make any requests for any documents 9 to counsel for PPG?</p> <p>10 A. There were some, yes.</p> <p>11 Q. Do you recall any instances where documents 12 that you requested were not provided to you by PPG?</p> <p>13 MR. LAGROTTERIA: Objection to form.</p> <p>14 THE WITNESS: No.</p> <p>15 BY MR. BARR:</p> <p>16 Q. And when I refer to PPG, I'm including their 17 attorneys. Do you understand that?</p> <p>18 A. I do.</p> <p>19 Q. Okay. Now, were you aware that PPG has 20 maintained a computerized database of the documents 21 produced by the parties in this case?</p> <p>22 A. I haven't been informed of any of that, no.</p> <p>23 Q. So, you never had access where you could 24 perform remote searches from your office in that 25 database for documents that might be relevant?</p>	<p style="text-align: center;">Page 24</p> <p>1 difference to me. So I wasn't really 2 concerned who owned it, when, or any of that.</p> <p>3 BY MR. BARR:</p> <p>4 Q. Okay. So those issues were not relevant to 5 the scope of your assignment?</p> <p>6 MR. LAGROTTERIA: Objection to form.</p> <p>7 You can answer.</p> <p>8 THE WITNESS: No. I am looking at 9 imagery on these dates.</p> <p>10 BY MR. BARR:</p> <p>11 Q. And I take it when you saw Ms. Stout's report 12 you became familiar with a company called 13 Columbia-Southern Chemical Company?</p> <p>14 MR. LAGROTTERIA: Objection to the form.</p> <p>15 You can answer it.</p> <p>16 THE WITNESS: I saw reference to that in 17 the report.</p> <p>18 BY MR. BARR:</p> <p>19 Q. Was that the first time you had seen 20 references to Columbia-Southern?</p> <p>21 A. Yeah. I believe so, yeah.</p> <p>22 Q. Okay. And when I refer to the United States, 23 sometimes I'll refer to the government, sometimes 24 I'll refer to agencies in the United States, I'm 25 using those terms interchangeably.</p>
<p style="text-align: center;">Page 23</p> <p>1 A. I didn't have a need for -- I didn't have any 2 requests, and I wasn't provided for any method of 3 searches on my own.</p> <p>4 Q. All right. Let me just go over a couple of 5 terms that we're going to use, I think, fairly 6 frequently in this matter, and just so that we have 7 a common frame of reference.</p> <p>8 When I refer to PPG, and the context is 9 before 1968, I'm referring to Pittsburgh Plate Glass 10 Company. After 1968, it became PPG Industries. So 11 you'll have that date in mind, I assume.</p> <p>12 From time to time, we'll refer to Natural 13 Products Refining Company or, for short, Natural 14 Products. And are you familiar with, you know, the 15 company, or you've seen references from time to time 16 to Natural Products?</p> <p>17 A. I've seen references in Ms. Stout's report, 18 yes.</p> <p>19 Q. Okay. Before you saw Ms. Stout's report 20 referring to Natural Products, were you familiar 21 with the operations or establishment, for example, 22 of Natural Products?</p> <p>23 MR. LAGROTTERIA: Objection to form.</p> <p>24 THE WITNESS: Who owned the property or 25 ownership and times like that, made no</p>	<p style="text-align: center;">Page 25</p> <p>1 A. Okay.</p> <p>2 Q. I just want you to know that. Okay.</p> <p>3 What we're going to do -- what we've done 4 before we went on the record is we marked four 5 exhibits that I know we're going to use quite a bit 6 today, and those are the reports that you prepared 7 and that Ms. Stout prepared.</p> <p>8 So I'm going to ask the court reporter to 9 hand you the stickered copies, and the extra copies 10 to counsel.</p> <p>11 MR. LAGROTTERIA: Thanks, Lew. (Whereupon, Defendant's Deposition 12 Exhibits Nos. Grip 1, Grip 2, Grip 3 13 and Grip 4 were marked for 14 Identification.)</p> <p>15 BY MR. BARR:</p> <p>16 Q. Okay. If you would just glance briefly at 17 your two reports. Your October 7th report is 18 Exhibit 1. And your January 6th report is 19 Exhibit 3.</p> <p>20 A. Yes.</p> <p>21 Q. And you recognize these as the reports that 22 you generated on behalf of PPG in this matter?</p> <p>23 A. Yes.</p> <p>24 MR. LAGROTTERIA: Look through them and</p>

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<p>1 make sure.</p> <p>2 BY MR. BARR:</p> <p>3 Q. I think for our present purposes all you need 4 to do is page through them.</p> <p>5 MR. LAGROTTERIA: Does it look okay?</p> <p>6 THE WITNESS: I mean, it looks okay, but 7 I haven't confirmed every bit, you know.</p> <p>8 BY MR. BARR:</p> <p>9 Q. No. And if in the course of the deposition 10 you see anything that you believe is amiss, please 11 let us know.</p> <p>12 A. Okay. Well, they do look like my reports.</p> <p>13 Q. Okay. The first question I have is, are all 14 of your opinions in this case contained in these two 15 documents, Exhibit 1 and Exhibit 3 to your 16 deposition?</p> <p>17 A. All my opinions -- I mean, all of these -- 18 the writings in these reports are my opinion. There 19 might be other opinions that I -- that as a result 20 of depositions, that I come up with, that I 21 conclude, but these currently are my opinions.</p> <p>22 Q. Okay. So as we sit here today, you have not 23 formulated any other opinions beyond the ones that 24 are stated in your two reports?</p> <p>25 MR. LAGROTTERIA: Object to the form.</p>	<p>1 to Ms. Stout's rebuttal report dated January 6th, 2 have you put those opinions in writing?</p> <p>3 A. No.</p> <p>4 Q. In connection with those additional opinions 5 that you've formulated, have you identified any 6 additional documents or data that are relevant to 7 those additional opinions?</p> <p>8 MR. LAGROTTERIA: Objection to the form.</p> <p>9 THE WITNESS: No. It's off of the work 10 that was already produced, but it was part of 11 the opinions are the data that I requested 12 from Ms. Stout that I had a chance to review 13 it finally.</p> <p>14 BY MR. BARR:</p> <p>15 Q. And you're referring to requests that have 16 been made through counsel since last December and 17 January reports?</p> <p>18 A. Yes. I made a request for files, and then 19 about a month later I got the files.</p> <p>20 Q. And you're aware that we made certain 21 requests to you for additional data?</p> <p>22 A. Right. And I promptly provided those. And 23 then there was some additional requests, and I 24 promptly provided that as well. I believe there 25 were three total requests.</p>
<p style="text-align: center;">Page 27</p> <p>1 Just to clarify, Lew, you're saying what 2 about Ms. Stout's rebuttal, are you asking if 3 he has any opinions about her rebuttal 4 report? Just so we are clear for the record 5 and not confusing the witness.</p> <p>6 MR. BARR: That's one of the things we 7 are going to need to develop.</p> <p>8 MR. LAGROTTERIA: Okay. Do you 9 understand it? Do you have any opinions 10 about her rebuttal report?</p> <p>11 THE WITNESS: I do have other opinions 12 about the rebuttal opinion, correct. That 13 might be cleared up through the deposition, 14 but I'm not certain.</p> <p>15 BY MR. BARR:</p> <p>16 Q. So that I'm crystal clear, it's your 17 testimony that you have formulated additional 18 opinions regarding Ms. Stout's rebuttal report?</p> <p>19 A. Yes.</p> <p>20 Q. Okay. And as far as the two reports that you 21 have submitted, these cite to all the documents on 22 which you rely in support of the opinions that 23 you've stated in these reports, correct?</p> <p>24 A. I believe they do.</p> <p>25 Q. The opinions that you've reached with respect</p>	<p style="text-align: center;">Page 29</p> <p>1 Q. Well, we certainly promptly provided our 2 information to counsel for PPG.</p> <p>3 Since the submission of your October 7th and 4 January 6th reports, have you modified any of the 5 opinions stated in those reports?</p> <p>6 A. I don't believe so, no.</p> <p>7 Q. Could you describe for the record your 8 assignment from PPG in this case?</p> <p>9 MR. LAGROTTERIA: Asked and answered, 10 but go ahead and answer.</p> <p>11 THE WITNESS: I was asked to gather up 12 the imagery of the site that I could find, 13 and then look at activities on the obvious 14 open and obvious piles that exist through 15 these years, or whenever I see these piles.</p> <p>16 BY MR. BARR:</p> <p>17 Q. What is -- what was your understanding of the 18 purpose of the assignment?</p> <p>19 MR. LAGROTTERIA: Objection to the 20 extent you're asking for communications 21 between counsel and Mr. Grip.</p> <p>22 THE WITNESS: The purpose of the 23 assignment is to understand what the 24 activities were on these piles historically. 25 //</p>

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<p>1           MR. BARR: Let's go back on the record.</p> <p>2       BY MR. BARR:</p> <p>3       Q. If I could please ask you to look at your</p> <p>4       October 2016 report, Exhibit 1, page 3 with a</p> <p>5       carryover to page 4, where you discuss the April 6,</p> <p>6       1940 aerial photograph. And having reviewed that</p> <p>7       portion of your report, if you turn to your</p> <p>8       Attachment B, Figures, and look, please, at the</p> <p>9       figure based upon the April 6, 1940 photograph.</p> <p>10      Have you found that figure yet?</p> <p>11      A. Oh, yes, I have. Sorry.</p> <p>12      Q. Okay. On that figure pertaining to the April</p> <p>13      6, 1940 aerial photograph, you've got your</p> <p>14      stockpiles. And then there is also a reference to a</p> <p>15      light-toned pile near the southern-most of the plant</p> <p>16      buildings.</p> <p>17      Do you see that?</p> <p>18      A. Yes.</p> <p>19      Q. Why did you find that light-toned pile to be</p> <p>20      noteworthy?</p> <p>21      A. I performed my initial mapping, and then I</p> <p>22      had discussions with counsel, and explained to them</p> <p>23      what I see on the site, counsel and other experts.</p> <p>24      Q. Now, did you measure the dimensions and</p> <p>25      volume of that light-toned pile?</p>	<p>1       piles?</p> <p>2       A. Well, you know, definitely on the earlier</p> <p>3       date I will call it a light-toned pile. On this</p> <p>4       date there is a light side to it. A part is in the</p> <p>5       shadow. It doesn't -- the overall texture and tone</p> <p>6       on the area around the pile is not as light as it</p> <p>7       was on the previous date.</p> <p>8       Q. Now, while we're on the November 1, 1940</p> <p>9       photograph, you refer to mud carts. What was the</p> <p>10      significance of the -- why did you find that</p> <p>11      activity noteworthy?</p> <p>12      A. I understood that mud carts were used to</p> <p>13      bring material out to the piles. It was just an</p> <p>14      observation of activity.</p> <p>15      Q. Out to the large stockpiles?</p> <p>16      A. Yes. I believe there's a pathway. It's</p> <p>17      almost off the plant site is the mud carts -- not</p> <p>18      the plant side -- they're in between the plant and</p> <p>19      the waste piles, that I have indicated on 11/1/1940.</p> <p>20      Q. And are you also aware that the mud carts</p> <p>21      brought material from those waste stockpiles back to</p> <p>22      the plant buildings?</p> <p>23      A. I just knew that they used these carts to</p> <p>24      transport material. I don't know what direction</p> <p>25      necessarily. I know the material had to somehow get</p>
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<p>1       A. I don't believe I have, no.</p> <p>2       Q. Why not?</p> <p>3       A. I just didn't. I didn't do it. Let's see.</p> <p>4       Q. You've performed measurements and volume</p> <p>5       calculations for other light-toned piles on other</p> <p>6       photographs, have you not?</p> <p>7       A. Yes, I have. I don't recall specifically. I</p> <p>8       know I identified that it was there, but --</p> <p>9       Q. Can you do so? Can you do those</p> <p>10      calculations? I don't mean right here and now.</p> <p>11      A. It's an -- they're not as consolidated on</p> <p>12      this date as they are on a later date, but yes, I</p> <p>13      can perform an estimate.</p> <p>14      Q. When you say "consolidated," what do you</p> <p>15      mean?</p> <p>16      A. Well, in the later years, it's more of a</p> <p>17      massive, consolidated pile. This is smaller,</p> <p>18      lower-lying piles in three rows, as I recall it.</p> <p>19      It's different than it -- it looks different than it</p> <p>20      did later. I believe you will see it later in that</p> <p>21      1940 year. The shadows bring out the detail a</p> <p>22      little bit more.</p> <p>23      Q. But, in any event, for the November 1, 1940</p> <p>24      photograph, you did not measure those -- those were</p> <p>25      also -- I guess you'd have to call them light-toned</p>	<p>1       out to these locations.</p> <p>2       Q. For the various light-toned piles that</p> <p>3       appear, well, for example, on the April 6, 1940</p> <p>4       photograph, and on other photographs, were you able</p> <p>5       to determine what the material was that was</p> <p>6       light-toned?</p> <p>7       A. First of all, I want to say, initially, in</p> <p>8       1940, I see these piles. And that they exist --</p> <p>9       they continue to exist in 1940, 11/1/40. And then</p> <p>10      they appear to be mostly taken away. The area is</p> <p>11      disturbed in '43. You can see parking and the mud</p> <p>12      carts are around that former area through 1944.</p> <p>13      Q. And you're referring to the December 22, 1943</p> <p>14      and December 24, 1943 photographs where you note the</p> <p>15      presence of the mud carts?</p> <p>16      A. Right. And I believe -- let me refer to</p> <p>17      my --- I don't want to go by memory. I refer to</p> <p>18      the light-toned pile and the dates following through</p> <p>19      4/4 -- 7/1 of '44 until another pile appears in</p> <p>20      4/28/1947. The composition of that pile, all I can</p> <p>21      tell you is the tone of the pile, the height of the</p> <p>22      pile, the proximity of the pile, you know, the</p> <p>23      slope, the texture of it based on the aerials.</p> <p>24      Q. Now, looking at these as a group, the April</p> <p>25      1940, the November 1940, the December 1943, and the</p>

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<p>1     July 1944 photographs, to the untrained eye there  2     appears to be a light-colored area in approximately  3     the same location in each of those photographs to  4     the south from the southern most factory buildings.  5       Do you agree with that?  6       A. Yes, but that does not mean there's a pile  7     there. It means that --  8       Q. I understand that. And that's why I didn't  9     use the word pile in the question.  10      A. All right. I apologize. It is a light-toned  11     area that remains. If you put a pile of coal in a  12     parking lot and then you scrape all the coal off,  13     there's still going to be material there that's that  14     color.  15      Q. As long as we're talking about the July 1,  16     1944 photograph, you note four sets of mud carts?  17      A. I see four arrows pointing to it. I don't  18     know if one arrow is possibly pointing to the same  19     set of mud carts. I would have to zoom in. But I  20     see -- there's definitely trains and mud carts that  21     you can see even without the labeling.  22      Q. Why did you find the presence of the mud  23     carts, whether it's three trains or four trains, to  24     be significant?  25      A. I just knew that that was involved with the</p>	<p>1     pointed it out on the imagery, that there's any  2     material in the area south of those plant buildings.  3     I don't see them in motion, so I don't see them  4     doing -- they're not active at that time in that  5     photograph, I don't believe, unless there's one -- I  6     don't see one called out on the pile, but I would  7     have to see the motion, the direction between each  8     frame.  9       Q. And I think you properly corrected me on the  10     July 1, '44, it's a light-toned area, but not  11     necessarily -- you don't see a light-toned pile?  12      A. Right.  13      Q. If you'd turn, please, to your rebuttal  14     report, Exhibit 3, and your figure that relates to  15     the October 27, 1942 aerial photograph. And if you  16     need to review the text on page 2 where you discuss  17     the October 27, 1942 aerial photograph, please go  18     right ahead.  19      A. Okay. I'm ready.  20      Q. On the October 27, 1942 photograph figure you  21     have what I take to be three references to trains of  22     mud carts. Am I reading that correctly?  23      A. Yes.  24      Q. And it appears that there is a light-toned  25     area next to those indicated trains and mud carts</p>
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<p>1     activities on these piles that I studied in my  2     scope. So I called that out.  3       Q. Okay. These mud carts, do you know whether  4     they were taking material to the large stockpiles to  5     the southeast or bringing material from those  6     stockpiles to the south of the plant building?  7       A. Southeast?  8       MR. LAGROTTERIA: Objection to the form.  9       THE WITNESS: Are you saying --  10      BY MR. BARR:  11       Q. Do you want --  12       A. Can you repeat it? I'm sorry.  13       MR. BARR: Yes. Please read back the  14     question.  15       (Question read back as follows:)  16       "QUESTION: These mud carts, do you know  17     whether they were taking material to the  18     large stockpiles to the southeast or bringing  19     material from those stockpiles to the south  20     of the plant building?"  21       A. In this actual photograph, I don't see motion  22     of these carts, which you can often -- or I don't  23     recall that these carts are in motion on this 7/1/44  24     date. So I don't know what direction they're moving  25     in either. I don't see by memory, and I haven't</p>	<p>1     again to the south of the plant buildings.  2       A. Yes. Okay.  3       Q. The light-toned area on the October 27, 1942  4     photograph, is that a pile or just an area?  5       A. It looks mainly like an area. There could be  6     remnant -- it looks like they cut into that original  7     surface. You can see the signature of some of these  8     features that were visible in 11/1 of 1940, that  9     they've cut into it, and so it's a -- there's some  10     elevation around it, but it's not as it was in the  11     1940. So it looks to be smoothed out in the  12     materials.  13       Q. Did you perform any calculations regarding  14     the dimensions or the volume of the material present  15     in that light-toned area as of the date of this 1942  16     photograph?  17       A. No.  18       Q. Any reason why not?  19       A. It's an absence of material. It's flat, by  20     memory. So I didn't -- and I didn't measure the  21     businesses of the flat area.  22       Q. Okay. So you didn't do the length and width  23     of that light-toned area, just as you did not do  24     that for the 1940 photographs, correct?  25       A. Right. That's correct, I did not measure</p>

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<p>1       that. I mean, you can, but I didn't see the need.</p> <p>2       Q. Let's go back to Exhibit 1, your October 2016</p> <p>3       report, and focus for a moment on the two December</p> <p>4       1942 photographs.</p> <p>5       A. Okay.</p> <p>6       Q. Now, if I understand you correctly, you did</p> <p>7       not attempt to characterize the nature of the</p> <p>8       material in the light-toned areas on these two</p> <p>9       photographs, correct?</p> <p>10      MR. LAGROTTERIA: Which two again?</p> <p>11      MR. BARR: The two December 1943 taken</p> <p>12       two days apart.</p> <p>13      A. From my memory, it was a lack of material,</p> <p>14       and it's just a light toned surface. I didn't</p> <p>15       measure that light-toned area.</p> <p>16      Q. Well, the question was, did you try to</p> <p>17       characterize the nature of that material in that</p> <p>18       area?</p> <p>19      MR. LAGROTTERIA: Objection to the form.</p> <p>20      You can answer.</p> <p>21      THE WITNESS: Insofar as if there was</p> <p>22       material there in the pile?</p> <p>23      BY MR. BARR:</p> <p>24      Q. Whatever formed the light tone would have</p> <p>25       been some kind of material.</p>	<p>1       A. I'm sorry. The plant buildings. We've been</p> <p>2       calling them the plant buildings.</p> <p>3       Q. What did I call them?</p> <p>4       A. Factory buildings.</p> <p>5       Q. Plant is just fine. In any event, these are</p> <p>6       the Natural Products plant buildings, correct, as</p> <p>7       far as you know?</p> <p>8       A. I don't know who owned it at this time. So I</p> <p>9       don't want to answer it in that way. There's</p> <p>10      buildings that are in the south of those buildings.</p> <p>11      Q. Okay. And this pile is in the same area as</p> <p>12      the previous light-toned piles and light-toned</p> <p>13      areas, correct?</p> <p>14      A. It's in the same general area, but it's more</p> <p>15       consolidated, taller, and obvious than the other</p> <p>16       date. This is one large, consolidated pile. The</p> <p>17       others were smaller, three-tiered piles, and then</p> <p>18       the materials was taken away and it was flat. And</p> <p>19       then this appeared on '47.</p> <p>20      Q. Are you aware of any aerial photographs taken</p> <p>21       between July 1, 1944 and April 28, 1947 of this</p> <p>22       area?</p> <p>23      A. Vertically -- let me see. I don't recall any</p> <p>24       vertical aerials that I've seen. There would be</p> <p>25       some obliques that were taken. There's some unknown</p>
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<p>1       A. Oh, what that material may -- no, not from</p> <p>2       the air. Other than the tone. I would have to have</p> <p>3       other information.</p> <p>4       Q. What other information would you need?</p> <p>5       A. A sample of what that is.</p> <p>6       Q. Or a description of that material in one or</p> <p>7       more documents?</p> <p>8       MR. LAGROTTERIA: Objection to form.</p> <p>9       You can answer.</p> <p>10      THE WITNESS: I would have to look at</p> <p>11       the document to see if it refers to that</p> <p>12       area, if it definitively does on that date,</p> <p>13       yes.</p> <p>14      BY MR. BARR:</p> <p>15      Q. All right. Let's look, please, in Exhibit 1</p> <p>16       at your figure pertaining to the April 28, 1947</p> <p>17       aerial photograph.</p> <p>18      A. Okay.</p> <p>19      Q. On this figure you refer to a light-toned</p> <p>20       pile again in this area to the south of the factory</p> <p>21       buildings?</p> <p>22      A. Yes.</p> <p>23      Q. And you --</p> <p>24      A. Well, plant buildings.</p> <p>25      Q. I beg your pardon?</p>	<p>1       dates of the obliques. But as a vertical, I'm not</p> <p>2       aware of any.</p> <p>3       Q. To the extent the dates for oblique</p> <p>4       photographs are unknown, is there any basis for</p> <p>5       saying that those obliques were taken between</p> <p>6       July 1, 1944 and April 28, 1947?</p> <p>7       MR. LAGROTTERIA: Objection to the form.</p> <p>8       You can answer.</p> <p>9       THE WITNESS: Yes, there's things that</p> <p>10       you can do to date those files.</p> <p>11      BY MR. BARR:</p> <p>12      Q. Have you dated any of those photos?</p> <p>13      A. I believe. Yes, I've done some of that in</p> <p>14       the report.</p> <p>15      Q. Let's -- if you can point me to where you</p> <p>16       have done that. I believe you're going to be</p> <p>17       referring me to Exhibit 1 Historical Oblique Aerial</p> <p>18       Photos?</p> <p>19      A. Yes. Well, let me see. It's Exhibit 1 and</p> <p>20       it's after the 2007 imagery. There's obliques. My</p> <p>21       apologies. I see a page I was missing. Yes, this</p> <p>22       says Historical Oblique Aerial Photos.</p> <p>23      Q. Right. Now, there were several which are</p> <p>24       labeled photo taken after April 28, 1947. And there</p> <p>25       are others which have no date indication at all. If</p>

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